AMERICAN Railroad Journal

·ESTABLISHED·1831·

Railroads, Tramways, Finance, New Inventions, Machinery.

WHOLE NO. 2,544.] NEW YORK, SEPTEMBER, 1883. [VOLUME LVII.—No. 6.

Railroad Notes.

We invite railroad officers to send us notice of elections, transfers, appointments, resignations, etc.; and all our readers would oblige us by furnishing us with any items of news which may come to their knowledge and are of a suitable nature for our columns. It is our intention to publish monthly full and accurate information regarding those enterprises and industries to which the AMERICAN RAILROAD JOURNAL is devoted, and to effect this end we solicit the coöperation of readers interested therein. We aim specially to record all new railway enterprises in the United States and Canada, and to note the progress of construction on all new roads and extensions; and we request those concerned in railway building to give us early information concerning the above, that our reports may be as complete as possible.

THE Merced *Star* says: It is an assured fact that thirty miles of the Turlock and Sierra Nevada Railroad will be in complete running order by the 1st of January, 1884.

THE Mann Boudoir Car Company has closed an agreement with the New York, New Haven and Hartford and the Boston and Albany Railroad companies for running the Mann Boudoir Sleeping Car on the New York and Boston route, by way of Springfield, after October 1.

THE New York, Danbury and Boston Railway Company was incorporated at Albany, N. Y., August 15. It is to run from New York City by the way of Port Chester to Danbury—a distance of fifty miles. Capital $3,000,000.

Returns to the Railroad Commissioners at Albany, N. Y., show that during the six months ended August 1, 160 persons were killed and 401 injured on the railroads of this State.

AT a meeting of the board of directors of the Highland Junction Storm King Bridge Railroad Company, held August 16, Charles S. Hill, representing the Eastern Railway system, was elected president. A communication was read from General J. H. Wilson, president of the New York and New England Railroad Company, agreeing to make a traffic contract with the Storm King Bridge Company to use the road and bridge when completed, and thus make an unbroken line from the East to the coal fields and the West.

THE Philadelphia and Reading Railroad Company has determined to manufacture a longer and much heavier rail than that now in use. The length of the rails now used is thirty feet, and those which the company will soon commence to manufacture will be just double that length. The weight of the latter will be seventy pounds to the yard, as compared with sixty-eight in the former. An especial feature of the new rail will be the uniting of the ends by an angular splice bar, which has been much improved and strengthened.

THE Cornwall and Mount Hope Railroad Company has been chartered to run from a point on the Cornwall Railroad near the Cornwall ore banks to a connection with the Reading and Columbia Railroad near Mount Hope, Lancaster county, Pa., a distance of four and a half miles.

THE Ridgway and Clearfield Railroad, a Pennsylvania Railroad branch, which is being built between the Philadelphia and Erie and the Low Grade Division of the Allegheny Valley Railroad, is ready for the rails. It will be thirty miles in length, and give the Clearfield county coals direct outlet to the West over the Philadelphia and Erie route.

IT is stated that the York and Oswego Midland Railroad Company is taking steps toward building a branch from Wurtsboro, N. Y., through the Neversink Valley to Port Jervis, and thence into Pennsylvania and down the Delaware Valley to the Water Gap. The New York, Lake Erie and Western Railroad Company is looking toward an extension in the same direction, representatives of that line having recently gone over the ground. The immense summer travel which has grown up in the Delaware Valley during the past few years is the incentive to these enterprises. Connection will be made at the Water Gap with the Delaware, Lackawanna and Western, the New York and New England, and the New York, Susquehanna and Western railroads.

THE managers of the Canadian Pacific Railway are said to be considering the project of building a branch line from a point on Lake Michigan across Wisconsin and Iowa to Kansas City.

MR. J. E. LOCKWOOD, general passenger and ticket agent of the Kansas City, Fort Scott and Memphis Railroad, announces the completion of the line to Nettleton, 424 miles from Kansas City, and through daily trains are now running between Kansas City and Nettleton.

THE Long Island Railroad Company has a corps of surveyors at work laying out a route for the extension of the

Long Island Railroad from its present terminus at Port Jefferson through the village to the shore of the bay. At Huntington, also, a similar survey is being made for the proposed extension of the railroad through Woodbury, Cold Spring and Huntington villages to the bay. The villages named are at present two or three miles from the railroad station. It is a part of the plans of the Long Island Railroad Company to reach points on the Sound shore opposite Connecticut and draw business from there to the summer resorts on the island.

THE contract has been awarded for straightening the tracks of the main line of the Philadelphia and Reading Railroad between West Falls and Manayunk.

THE stockholders of the Ohio Central Railroad will consider, at their meeting in September, the proposed lease of the Virginia Division and Ohio bridge of the company to the Chesapeake and Ohio, and the proposed lease of the Columbus Branch of the company's railroad to the Columbus and Eastern Railroad Company.

THE official statement of the business of all lines of the Pennsylvania Railroad Company east of Pittsburgh and Erie, for July, 1883, as compared with that month in 1882, shows a decrease in gross earnings of $18,200, an increase in expenses of $136,159; a decrease in net earnings of $154,359. The seven months of 1883 as compared with the like period in 1882 show an increase in gross earaings of $1,683,533; an increase in expenses of $1,509,188: an increase in net earnings of $174,345. All lines west of Pittsburgh and Erie for the seven months of 1883, show a surplus over all liabilities of $309,690, being a decrease as compared with the same period of 1882, of $45,340.

THE stockholders of the Norfolk Southern Railroad at a meeting in New York on the 15th ult., elected the following directors for the ensuing year: Messrs. Wm. H. Phillips, George C. Wood, E. W. Corlies, Wm. G. Dominick, John N. Whiting, Henry J. Cullen, Jr., James Benedict, Wm. H. Male and Alfred H. Porter.

THE stations to be built along the Schuylkill Valley Railroad will be very handsome in architecture and surrounded by ornamental lawns.

PROGRESSIVE Frenchmen have been trying to force railroad companies to use the cars on the American plan, with aisles running lengthwise, but without much success.

GENERAL WARNER says the Ohio Valley road will be completed within a year. It is to be a great coal road. The maximum grade will be only thirteen feet to the mile, and with grades so light one locomotive can draw a heavier load than five on an ordinary track.

THE annual report of the St. Paul, Minneapolis and Manitoba Railroad for the year ended June 30, 1883, shows that the net earnings per mile during the year were $3,994.62.

IT is expected that the New Orleans and Northeastern, which will extend the Cincinnati Southern into New Orleans, will be completed within ninety days. The trestlework twenty-seven miles in length across Lake Pontchartrain is half done, and the grading is nearly all completed.

MR. SAMUEL BRAY, civil engineer, formerly of Port Stanley, has been appointed engineer on the Ontario and Quebec Railway.

THE July report of the Baltimore and Ohio Employés' Relief Association shows that for the month 610 benefits were paid to members. In the list were payments aggregating $3,000 for three accidental deaths, and payments for seven deaths from natural causes.

NEW YORK, LAKE ERIE AND WESTERN—The Delaware Division will soon be known as the "flower garden of the Erie," owing to the management of superintendent W. J. Murphy, who has had beautiful little parks constructed, beside and between the tracks, at every station along the road between Susquehanna and Port Jervis. It was an experiment this year, but already these flower gardens along the Erie are becoming the general talk of the traveling public.

THE official statement of earnings of the Philadelphia and Reading Railroad for July gives the gross receipts of the railroad and coal and iron companies at $4,418,840, of which $2,979,093 was contributed by the railroad and $1,439,746 by the coal and iron company. The total expenses for the months were $2,914,493, leaving profits of $1,504,347, a gain as compared with the corresponding month last year of $396,040. The net earnings of both companies for the seven months of 1883 were $7,055,571, being an increase compared with corresponding period last year of $935,649. This statement includes the business of the Central Railroad of New Jersey and branches.

A FLOURISHING ROAD.—The annual report of the St. Paul, Minneapolis and Manitoba Railway Company, for the year ending June 30, was presented at the annual meeting, held on the 15th ult., from which it appears the gross earnings were $9,240,631; aggregate expenses, $4,595,009; net earnings, $4,646,000; interest paid and accrued, $1,264,000, leaving a net income of $3,381,000. Dividends paid, $1,724,664; net surplus from traffic, $1,656,631.36, which, added to income account of June 30, 1882, shows a surplus of $4,929,976.58. The amount of the capital stock is $20,000,000; the amount of funded debt at the close of the year, $20,791,720. The net earnings, after paying fixed charges, were 19 per cent. of the capital stock.

ALL the passenger trains on the Philadelphia and Reading Railroad are now run with the dirt-burning engines. These locomotives have been put on because of their capacity to haul heavy trains at increased rate of speed.

MR. ALLEN MCCOY has been appointed assistant general manager of the New York, Texas and Mexican road, vice C. K. Westcoat, who has been assigned to other duties. Mr. McCoy's headquarters will be situated at Victoria, Tex.

IT is stated that the gauge of the Philadelphia and Atlantic City Railroad will be changed to standard during next month.

THE Philadelphia and Erie Railroad Company reports its earnings for July as follows: Gross earnings, $329,031; expenses, $213,714; net earnings, $115,317; net earnings July, 1882, $160,974; decrease, $45,657. The net earnings for the seven months of 1883, were $807,437; net earnings for seven months of 1882, $734,490; increase, $72,947.

THE Fond Du Lac, Amboy and Peoria Railway has fallen into the possession of the Chicago, Milwaukee and St. Paul Railroad Company. The road consists of only thirty miles of track, and runs from Fond Du Lac to Iron Ridge. The road has a bonded indebtedness of $120,000, of which $100,000 is held in the East.

THE business of the Michigan Central has increased so rapidly of late that it has been found necessary to make large additions to the motive power. The new passenger engines with 18 x 24-inch cylinders have been ordered from the Schenectady Locomotive Works for the Canada Southern Division, and it is expected they will be ready for service in a few weeks. The through travel continues to be very heavy, and in consequence it has been decided to place another sleeper on the Pacific express leaving St. Thomas at 5.10 P. M. for the West. This sleeper will be run through from New York to St. Louis without change. Two are now in use on the morning train.

The Norwalk, Conn., *Gazette* says that the proposed New York, Danbury and Boston road is to run from Danbury to New Milford, where it will connect with the Housatonic, thence northward into Massachusetts, to connect with the shortest lines to Boston, Albany and northern New England. The *Gazette* adds: "It will be seen that this railroad scheme is of far greater magnitude than was at first supposed, and from its important connections with other roads is not wanting in any of the elements of promised financial success.

DURING the past twelve months the Wisconsin Central Railway Company has sold 20,000 acres of its land in Marathon, Taylor, Price, Clark and Adams counties at an average price of $5 per acre. These sales have been made exclusively to actual settlers.

TRAFFIC Manager Vining, at Omaha, reports to President Dillon of the Union Pacific Railroad, that the crops in Kansas of all kinds are the best known for years, while in Nebraska all grains have turned out well, and cattle on the plains are doing well. The California business of the Union Pacific continues satisfactory, and the traffic to the mining region is heavy.

WILLIAM B. STEARNS, president of the Fitchburgh Railroad, died September 3, of Bright's disease in Boston, aged 56 years.

MR. E. D. WORCESTER, secretary of the New York Central Railroad, is in Switzerland with his family. His health is rapidly improving, and he hopes to be able soon to resume his official duties.

BONDS OF THE SAVANNAH, ALBANY AND GULF.—C. S. Hardee, city treasurer at Savannah, Ga., asks the holders of the Savannah, Albany and Gulf Railroad bonds, indorsed by the city of Savannah, who agree to a compromise offered by the city, to present the bonds at the office of Eugene Kelly & Co. in New York, or at his office in Savannah, to be stamped in order to indicate acceptance. The road, which was merged with the Atlantic and Gulf Railroad, is now known as the Savannah, Florida and Western Railroad. Mr. Eugene Kelly, the banker, says that on Sherman's memorable march from Atlanta to the sea, the Union troops destroyed a portion of the road, so that it could not be used by the Confederate Army. To repair the damage the railroad company issued $450,000 in bonds which were indorsed by the city of Savannah. The railroad company failed, and the city of Savannah refused to pay the bonds, which were due Jan. 1, 1877. Suit was brought in the name of Mr. Kelly in the interest of the holders. The city was beaten in the Circuit Court of the United States, and again as an appeal in the United States Supreme Court at Washington. The city had failed on its own bonds and was largely in debt. It now proposed, Mr. Kelly said, to issue $1,300 in new bonds for each $1,000 of the old railroad bonds drawing interest at 5 per cent., and running for thirty years. The railroad bonds drew 6 per cent. There were twelve coupons of $30 each remaining unpaid on them, and the extra $300 allowed was to make up for this interest. It was stipulated that $200,000 of the old bonds must come in before the new ones could be issued. Of this amount $160,000 had already been presented.

OUR valued exchange, *Engineering*, reports that the plan of telegraphing by flashing signals between the islands of Mauritius and Reunion, which we announced as projected some time ago, has been realized by M. Adams. He was obliged to forsake the station of Saint-Rose in Reunion from the difficulty of getting potable water; but the station on Nefles has proved better provided in this respect, though it is further away from Mauritius, namely, 245 kilometres. Observers in Mauritius can read the signals, and thus the proposed telegraph may be considered practicable, though all the arrangements for announcing cyclones, etc., are not yet completed.

IT appears from recent returns that each engine of the Pennsylvania road cost last year, $6.56 for repairs, £6.73 for fuel and eighty-six cents for stores for each 100 miles run. The consumption per mile was eighty-two pounds of coal, 5.3 quarts of oil and 3.8 pounds of tallow. The average of passenger cars to an engine was 5.14, and of freight, 24.5. The average length of train varied from 10.61 cars on the heavy grades to 36.9, while the consumption of coal per car-mile varied from 11.12 pounds to 2.92 pounds. In other words, it costs four times as much to move freight over the mountains as to transport it over average grades.

ON the Hamburg tramways a number of cars, with flangeless wheels, much like omnibuses, and with turning gear, are working. To run on the lines, these cars are fitted with a shaft in front of the front wheels, this shaft carrying on a lever a disc wheel which the driver can lower into the tramrail groove as he requires, or raise it when it is necessary to get out of the way of o structions. The arrangement is said to work well and save a lot of trouble, the cars running easier than those with flanged wheels.—*Railway Times, London.*

A GOOD suggestion appears in *Harper's Monthly* for September. "I caught the first steamer—*Britannia*, April 20—to Boston, where I took unto myself a wife, and embarked with her for the Sandwich Islands, November 12, on the good ship *Congaree*. Our 'wedding journey' of five months at sea, without sight of land, I commend to all young married couples as the most efficient method of getting acquainted with each other."

A MAGNIFICENT new bridge is in course of erection across the river at Minneapolis, and nearing completion. It will have a double track of rails. The bridge is of stone, and of imposing architecture.

AMERICAN Railroad Journal

·ESTABLISHED·1831·

PUBLISHED MONTHLY BY THE

PHENIX PUBLISHING CO. OF N. Y.,

AT

No. 245 BROADWAY, NEW YORK.

GEO. F. SWAIN, PRESIDENT. L. FAIRBANKS, JR., VICE-PRESIDENT.
CHAS. T. VALENTINE, SEC. AND TREAS.

Entered at the Post Office at New York City as Second-Class Mail Matter.

SUBSCRIPTION RATES.

Subscription, per annum **$3 00**
Foreign subscription, per annum [including postage] **3 24**
Single copies **25**

ADVERTISING RATES.

Space (3¼ in. wide).	1 Mo.	3 Mos.	6 Mos.	12 Mos.
1 inch	$4.00	$10.00	$17.00	$31.00
¼ col	9.00	22.00	40.00	70.00
½ col	15.00	40.00	70.00	120.00
1 col. (9¾ in.)	26.00	72.00	130.00	235.00
¼ page	15.00	40.00	70.00	120.00
½ page	26.00	72.00	130.00	235.00
1 page	48.00	115.00	210.00	400.00

For inside of covers, add 25 per cent.; for outside of back cover, add 50 per cent.; no advertisements will be taken for title-page.

The above terms are *net*, and for three months, six months or yearly contracts, are payable quarterly. Contracts for less time are payable after receipt of first number containing the advertisement.

MR. FREDERICK ALGAR, Nos. 11 and 12 Clements Lane, Lombard Street, London, E. C., England, is the authorized European Agent for the JOURNAL.

THE AMERICAN RAILROAD JOURNAL is sent regularly to all whose names appear on our books as those of subscribers, until they close their subscription by communication with the publishers.

ADVERTISERS and subscribers are respectfully cautioned against making payments to any person professing to represent this JOURNAL, *excepting he is able to show a written order from this office, duly signed by the president or secretary.*

☞ No railroad passes should be given to any one representing this Journal, unless he shows written authority to ask for same, signed by the President or Treasurer.

NEW YORK, SEPTEMBER, 1883.

Principal Contents of this Number.

SEVERAL of our exchanges have printed the announcement that R. S. ELLIOTT, of St. Louis, has a book in press, entitled "Notes Taken in Sixty Years," and which contains the following paragraph: "It is a queer and generally unknown fact that the first railroad journal ever issued was published at Rogersville, Tenn., 1830–31. CLINTON ARMSTRONG was then publishing a religious monthly magazine of Calvinistic character, and in addition issued weekly for one year the *Railroad Advocate*, telling its readers about railways, so far as then known, and urging their construction. JOHN A. MCKINNEY, of Rogersville, was a believer in rapid transit by rail, and in an address published in Mr. ARMSTRONG's *Advocate*, told the folks in butternut jeans that if they had a railroad a man might breakfast in Knoxville and dine in Abingdon! In 1845 CLINTON ARMSTRONG removed to St. Louis County, Mo., to the well-known homestead of the family near Kirkwood, where his sons yet reside." We have no reason to doubt that this is true, but the first number of the AMERICAN RAILROAD JOURNAL was printed in the year 1831, had a national and not merely local character, and was the beginning of a journalistic enterprise which exists after more than a half-century's life, with the prospect of an indefinite expansion of its prosperity in the future. This JOURNAL is unique to-day, among publications of its class, for age and prestige; and in standing and usefulness, to say the least, is numbered with the great representative periodicals of this busy age of the world.

THE average tractive power of the newest American locomotives is twenty thousand pounds, a gain of some seven thousand or eight thousand pounds over those manufactured a decade since. As to average speed, trains are run faster now than previously in the history of railway industry on this continent; and the exceptional rapidity with which some few are run on lines of excellent construction, together with the steady improvement noticeable in road-beds and the demand for higher speed, lead to the expectation of improved results in this particular. The calculation is that twelve millions of dollars are invested in the manufacture of locomotives in the United States, distributed among fifteen firms. An average locomotive weighs nearly forty-eight tons of two thousand pounds, has four driving-wheels, and presents improvements in construction, especially in the cylinder, which were unknown ten or twelve years ago. It is remarkable that American locomotives belonging to different companies are approximately alike, having fewer differences in appearance and construction than English locomotives, for example. The British plan of each company having an efficient and high-salaried man in its employment, whose business it is to study the details of their construction,

with the view to the constant improvement of locomotives, is one which merits the earnest consideration of American companies. We see in a late number of the London *Times* that the best English locomotives, those employed in the running of fast express trains, are good for that service only about eighteen months, although constructed in the best manner. They are afterwards used in ordinary traffic, but virtual newness and continual improvements are the reasons why, so far as the construction of locomotives goes, the express service of Great Britain exhibits its magnificent capabilities in the matter of speed. Straighter and better made tracks are other reasons, of course, but these are less imitable than the admirable system of which we have spoken, of securing the best results in the construction of locomotives.

MONOPOLISTS.

THERE is a growing feeling among a large number of people in this country, against a certain class of persons aggregated under the above heading of monopolists. We either do not understand what a monopolist is, or else we are slow to appreciate the cause of ill feeling entertained. In our mind, the word monopolist means a man who has the entire and supreme monopoly or control of any given thing. If but one man in the world had brains, and no other man could procure any, then the man with brains would be a monopolist. He would be a monopolist too, without any fault of his own, or any credit for being such. He would stand in this great world, of all the countless number born in it, as the one man who brought into the world something no other man could bring into it. Among beings created and not created, we have but one such monopolist, and that being is God himself. He is a monopolist in the work of creating, for no person outside of himself has ever created a single thing. The record of this earth's early history states that out of nothing all things that are now seen were created, and that the being whose matchless power has accomplished this we must call God. We must also call him a monopolist in this particular field, until some one else appears who can make something out of nothing. Now without being blasphemous, no man can claim that any human being can exercise this prerogative of the Divine; and therefore any man who has accomplished anything, has succeeded in so doing by taking advantage of things already in existence, either singly or by combining a certain number of them. Some one may ask, how some man in a community has noticed that certain causes produced certain results, or a combination of certain causes has produced certain results, while all the other men in the community never had an idea on the subject?

The only answer is that the one man has been continually thinking on the result desired, and has steadfastly kept his mind in the direction of the cause until he reached it. When he reached the cause that would produce the desired result, he became master of the situation, but not the owner of the cause, nor the sole beneficiary of the result.

Because of devoting himself to the one object, to the excluding of himself from benefiting himself in other directions, communities have readily recognized the justice of allowing him the pecuniary profits of his enterprise for a given number of years to the exclusion of others, who having neglected this one path, chose other paths in the same hope of remuneration, in which, if successful, they would exclude him.

This man, no matter how rich he becomes or how closely guarded by law his enterprise may be, is not a monopolist. The universal law of bringing nothing into the world and carrying nothing out, leaves in the world all the results of his labors when death removes him. He has not monopolized anything, because he carries nothing with him. On the contrary, he has left the world a great deal better and wiser because of his having lived in it.

The other day some labor unions had a procession in this city, and among other transparencies or banners, was one bearing the sentiment of down with a certain man. There are unpleasant episodes connected with this man's life no doubt, and he has been connected with certain combinations for gain that have proved distasteful to the majority of men. But what about that towering genius that has read men as readily as one reads a book, and successfully operated on the knowledge thus gained? Because he holds control of certain combinations, and is reputed to be worth millions, he is called a monopolist, and a banner is paraded through the streets of New York bearing the sentiment of "down with him."

Many men marching under that banner would willingly change places with him, and bear his unsavory reputation if they could have his wealth. They would willingly adopt the same methods if they only possessed the same fertile brain and daring execution. He is called a monopolist now, but when he came into the world he had nothing, and when he goes out of the world he will take nothing, and when that fertile brain is laid at rest, the power to own and control will cease, and all these properties and combinations must pass into the hands of others. Have then the laboring men no cause of complaint?

Yes, so far as their needs are concerned. The divine law is, that we must deal with a man not according to his deserts, but according to his needs. When this law is taken into account, the laboring man has cause of complaint, because he sees it is not fulfilled. But when we take the question of desert, the cause of complaints becomes very obscure. We know there are immensely rich men who never earned a dollar, but received their wealth

by inheritance, but the number of such is so scarce in the United States that we are not disturbed by them. The majority of large capitalists, however, are more like the men who are so-called monopolists. These men were poor boys, having to overcome obstacles in order to get a foothold. To-day some of them have in their work-shops men who worked with them side by side when they were apprentices. Some of these so-called monopolists have begged for their daily bread, have tramped through the country hunting for work, have struggled with poverty in all its forms. The laboring men of to-day have no more adverse circumstances than had these so-called monopolists when they were laboring men.

What is the difference? Barring the accident of birth and all the untoward circumstances of life, the one difference between the successful and the unsuccessful is, that the former had a purpose in life and bent everything to its accomplishment, while the latter were willing to drift, and could sacrifice business for pleasure.

We have written the above actuated solely by the desire to benefit the laboring man. They cannot pull themselves up by pulling others down. They must study those who are up, and adapting the means to an end, raise themselves.

The Last Spike.

On the eighth of September last a golden spike was driven which ended the labor of thirteen years, and completed, as was observed by ex-President Billings on the occasion, "the best line across this continent, unequaled in the variety of its resources." The completion of "the new highway between Europe, America and Asia"—the quotation is from President Villard—was, to employ his phraseology again, "an international festival," attended not only by representatives of the executive, legislative and judicial departments of the Federal administration of the Union, by the governors of States and Territories, and by many distinguished citizens of our own land, but by those whose presence indicated, with graceful emphasis, the interest felt in the completion of our new trans-continental thoroughfare by foreign visitors. Moreover, local citizens had assembled in a vast crowd to witness the ceremony, which was accompanied by eloquent speeches, the booming of cannon, and shouts of popular joy. At half-past three in the afternoon of September 8, 1883, when a few blows of a silver mallet on a golden spike completed the Northern Pacific Railroad, Gold Spike, Montana, became a name of historic celebrity. The point of junction thus distinguished is situated about sixty miles west of Helena, Montana.

The history of the project, the consummation of which we record, forms an interesting chapter in the story of the nation's development.

The construction of a railroad from New York to the Columbia River was first proposed forty-eight years ago. In 1845 Asa Whitney, a merchant of New York City, proposed to the United States Congress that a road should be built from the great lakes to the mouth of the Columbia, in consideration of a land grant of sixty miles in width along the entire route. The plan failed to win Congressional approval. In 1853 the Government surveyed five routes to the Pacific. The northern route was laid out by Governor I. I. Stevens, of Washington Territory, and his report was favorable. The subject was pigeon-holed, however, and when it was brought out later, and a charter for the road sought in 1862, the effort resulted in failure. Josiah Perham, a New England merchant, was the man who at last secured a charter, in 1864. In December, 1865, he sold the franchise to some New England capitalists for barely enough to pay his debts, and died three years later, before the first spadeful of earth had been turned on the proposed road. The president of the new company was ex-Governor J. Gregory Smith, of Vermont, and associated with him were Messrs. J. Edgar Thompson, of the Pennsylvania, Robert Burdell, of the Erie, W. G. Fargo, of the New York Central, W. B. Ogden, of the Chicago and Northwestern, and G. W. Cass, of the Pittsburgh, Fort Wayne and Chicago. No progress toward actual construction was made until Mr. Jay Cooke assumed financial direction, obtained legislation authorizing the issue of bonds, and put the bonds on the American market. From the spring of 1870 to the spring of 1872 he sold about thirty-million dollars' worth of bonds. Work was begun on the road in 1870 at Thompson Junction, twenty-three miles west of Duluth, and also at Kalama on the Columbia River. In 1871 the road was finished from Thompson Junction to the Red River of the North, and 1873 saw it extended to Bismarck, on the Missouri River, while by that time 105 miles had been finished between the Columbia River and Puget Sound, and the terminal city of Tacoma laid out. The panic of 1873 destroyed Mr. Cooke's banking house, and left the railroad paralyzed with a large floating debt, and a bonded debt of thirty million dollars, at seven and three-tenths per cent interest. Earnings on the completed portions hardly paid running expenses. Few settlers moved into the country along its line. President Smith resigned and was succeeded by Mr. Cass, and he was in turn succeeded by Mr. C. B. Wright, of Philadelphia. In 1875 a reorganization of affairs was effected, the bondholders accepted preferred stock in lieu of their bonds, the road was hurried through the bankruptcy court, and by 1879 it had paid off its floating debt and was earning some net profits on the completed portions. A thirty-mile road was built from Tacoma to the Cascade Mountains coal beds. Wheat culture was begun in the Red River Valley, and settlers flocked in rapidly. Work was carried forward at both ends of the route. By 1880 President Billings had secured funds for filling the gap in the track—more than eight hundred miles, across Montana—by a loan of forty million dollars negotiated by Winslow, Lanier & Co., Drexel, Morgan & Co., August Belmont & Co., of New York, and J. S. Morgan Co., of London. In 1881 a controlling interest was purchased in the road by Mr. Henry Villard, who was largely interested in various transportation lines in the Northwest. He obtained eight million dollars, by a "blind pool"—that is, the money was contributed by capitalists, to be used by him as he saw fit, and on no security except his personal receipt. In September, 1881, Mr. Villard was elected president, and his former associate in Western railroad management, Mr. T. F. Oakes, vice-president. At the beginning of 1883 only three hundred miles of track remained to be laid, on most of which line

the grading had been done. During the summer this gap was closed up, making the iron highway complete and ready for travel from Duluth to Tacoma, a distance of a little more than 1,980 miles. There are also 674 miles of branches, mostly completed, giving a grand total of more than 2,654 miles of road.

The Vanderbilt Lines in Pennsylvania.

THE Cleveland *Herald* reports that the Vanderbilt system is the seeond great trunk line assured to Pittsburgh. Philadelphia and Reading gives entrance to New York, Philadelphia and Harrisburg. The Pittsburgh and Lake Erie, lately passed into Mr. Vanderbilt's hands, gives line connection with Lake Shore. Contracts for grading the Harrisburg and Western, 220 miles long, to be built by the Vanderbilt-Gowen syndicate, will be let in September. The Pittsburgh, McKeesport and Youghiogheny will be opened this month. The Youghiogheny road passes between the banks of the Monongahela and the tracks of the Pittsburgh, Virginia and Charleston to Homestead, where it crosses the river. Ir recrosses the Monongahela at McKeesport, and then follows the left bank of the Youghiogheny to Dawson. From Dawson there is a four-mile branch along Dickerson Run for coal and coke. The road is building to Bradford, where the West Youghiogheny branch, which has passed out of the hands of Baltimore and Ohio, connects the road with Connellsville. By this road, which runs to Summit, near Scotdale, and is being extended to Mount Pleasant, Mr. Vanderbilt will get a large coal traffic. A branch to Uniontown for a coke traffic, and to Bellevernon, on the Monongahela East Shore road, to the undeveloped coal country are projected. The construction of a branch line eighty-nine miles to the Virginia state line, to be known as the Monongahela East Shore road, was begun two weeks ago. This road begins at McKeesport and runs to Port Marion. It will go into the rich mineral section of Virginia, and will open up an iron trade which may seriously interfere with Lake Superior and foreign ores. The Baltimore and Ohio people have not been idle during the activity of the Pennsylvania and Vanderbilt people. During the year they have purchased the Pittsburgh Southern road, between Pittsburgh and Washington, Pa., and built the Streets Run Branch to connect with it. This new road, in connection with the Washington and Wheeling Railroad, gives a direct line from Wheeling to Pittsburgh, and saves a haul of 100 miles in reaching the southwest connection of Baltimore and Ohio.

WORKS OF THE CAMBRIA IRON COMPANY.—A writer in *Harper's* for August, expatiates on these in the following language, which is one of many quotable passages in "The Heart of the Alleghanies." "A little higher, at Johnstown, in the valley of the Conemaugh, we encountered the works of the Cambria Iron Company, which roar and flame proudly, as if aware that they constitute probably the biggest single iron and steel works in the world. The company employs 8,000 operatives; keeps nine furnaces going at this place and four elsewhere; has perhaps eighty acres under roof at Johnstown; mines 700,000 tons of coal a year for its own use, and does annually a business of $18,000,000 or $20,000,000. It produced in 1881 45,000 tons of iron rails, and 120,000 tons of steel, saying nothing of steel springs in quantity, boiler iron, or the machinery manufactured for its own use. It is worth recording that eminent foreign mechanicians have admitted that at Johnstown three times the amount of work is done which would bc accomplished with the same plant in Europe. In and out of the shops and all through the yards wind forty miles of track, on which trains loaded with ore, coal, slag, or hot ingots of steel are running every moment or two, eighteen locomotives being kept in use for this purpose, and several stackless ones for running into the adjacent mines. The steel ingots, by the way, are the largest steel castings made anywhere, excepting Krupp cannon, and weigh 5,500 pounds each, meausuring eighteen inches and a half square, and yielding eight rails apiece. The works were founded at this spot with the idea of utilizing the iron ore of the vicinity; but steel has now become its supreme object, and ores are brought from Spain, Ireland, Elba and Michigan, to mix with the local brown hematites. The direct coal flame is not used in fusing the ore, but only the gases generated from coal. This intensified heat is stored in Whitworth stoves—immense iron-bound cylinders like chimneys, inside of which the temperature is 1,700° Fahrenheit. Thence it is distributed through pipes wherever it is wanted; but first the burning gases are passed through a receptacle charged with water, which actually *washes the fire*, so as to remove various constituents that might coat and injure the tubes through which it is conveyed. The calorific agent thus prepared not only supplies the furnaces, but runs the hydraulic and other engines, and is in part carried back to the stove to begin over again. So that, said Mr. Webb, the general superintendent, we come as near to lifting ourselves by our own boot-straps as is possible."

CHIEF ENGINEER STONE submitted a report which was adopted at the recent meeting of the Board of directors of the Florida Ship Canal and Transit Company. The following passage is quoted from it: "I have computed that a tidewater ship canal of sufficient width and depth to allow the passage of two sea-going steamers of the first class without inconvenience, can be constructed at a total cost of $46,000,000, as follows: Excavations, $36,000,000; harbors at termini, $4,500,000; engineering, right of way, and contingencies, $5,500,000. The total length of the canal would be 137½ miles, and the highest elevation in crossing the watershed 143 feet, but this deep cut would be only for a short distance.

The saving of distance to steam vessels between New York and New Orleans would be 500 miles; New Orleans and Liverpool, 412 miles; New York and Pensacola, 600 miles. The gain by avoiding the dangerous passage through the Florida Straits would be very great, and not the least important commercial advantage of the proposed canal would come from the saving on insurance, which is now much heavier for Gulf ports than for South Atlantic ports, and in the expense, which on a large steamer is from $500 to $800 a day." Governor Brown expressed the belief that parts of the work would be under contract in ninety days.

RAILROAD MEDICAL SERVICE.

BY S. S. HERRICK, M.D.,
SECRETARY BOARD OF HEALTH, STATE OF LOUSIANA.

ITALY CONTINUED.

IN 1863 the Relief and Pension Fund (*La Cassa di Soccorso e di Pensioni*) was created by a ministerial decree for the benefit of the *personnel* of the State railways, and in 1864 the Mutual Relief Association (*Il Consorzio di Mutuo Soccorso*) was organized among the employés of the railroads of Lombardy and Central Italy. These went out of existence in 1870, and a new Mutual Relief Association was organized of the *personnel* of all the lines belonging to the Railway Company of Upper Italy. The regulations of this society are before me, and a free translation is made of the most important portions.

This institution has for its purpose: 1. To provide relief and medical attendance for those employés who are members. 2. To aid, by a daily allowance, those employed by the day, when their wages are stopped. 3. To provide indemnity for the expense of medicines purchased. 4. To meet funeral expenses, in case of death. 5. To afford extraordinary donations once for all, or donations renewable yearly, in addition to the funds granted by vote of the committee—(a) to widows and minor children; (b) to surviving parents, who were dependent on the employés, if needy and unable to work; (c) to employés superannuated or disabled for work by some grave malady; (d) to members who, after a definite period of illness, have forfeited right to ordinary relief.

Membership in the association is obligatory upon the following: 1. All operatives in the shops and in the department of *maintenance;* 2. All employés temporarily belonging to the various branches of the departments of *operation* and *maintenance;* 3. All those belonging to these two departments, whose annual wages amount to less than 1,200 *lire* ($240); 4. Finally, all employés hereafter admitted for the first time to either of the permanent occupations must join the association, subscribe to all the conditions, including deduction of wages for days of sickness.

Employés who were not members of the Mutual Relief Association at the end of the year 1869, have the privilege of joining on the following conditions: All applications for membership must be transmitted by employés through their respective foreman within thirty days from date of publication of the present regulations. Applications drawn up in prescribed form shall contain express agreement to submit (a) to the regular deduction of wages hereafter noted; (b) to deduction of wages during the period of sickness; (c) finally, to all the obligations and rules laid down in the present regulations. All employés who have not made known, within thirty days, their determination in the manner stated, shall be inscribed at the office of the Association and subjected to all the obligations of the present regulations, including deduction from wages during the period of sickness. Those who, on the other hand, have decided not to join the Association, will remain subject to the respective social and governing regulations in force at the end of 1869. Employés in the departments of operation and maintenance, having wages less than 1,200 *lire per annum*, will not be enrolled, when assigned to the central and affiliated offices in the departments of direction, of traffic, of equipment, of traction and of maintenance (repairs).

Hereafter no one will be admitted to membership who does not make declaration, supported by a medical certificate, that he is of sound and strong constitution, free of organic defects, and not over a certain age.

The capital of the *Consorzio* is composed of the funds derived from liquidation of the suppressed organizations previously mentioned, and will be augmented as follows: 1. By a deduction made upon salaries or wages of members, whether participating or not in the Pension Fund (*Cassa-Pensioni*). 2. By half of the deductions imposed on employés or permanent agents on account of sickness or absence. 3. By all fines imposed by the administration. 4. By the sale of articles left in station-houses or carriages, and those found along the lines, less the portion due to the finder; also of goods abandoned by their owners, provided the price realized exceeds the cost of transportation together with storage and expense of keeping. 5. By the interest on the investment of the capital of the Association. 6. By donations and legacies.

The deduction from wages is fixed at one and a half per cent. for workmen in the shops; and one per cent. for all other employés, whether upon yearly salaries or daily wages.

Any contributor to the Association falling sick and giving immediate notice to his foreman on quitting work, will be entitled, after the third day of sickness duly certified, (a) to relief and gratuitous attendance from the local physician of the *Consorzio* from the first day of sickness; (b) after the third day of sickness duly certified, to a daily allowance during the course of the illness and convalescence; (c) to a final indemnity for the cost of medicines, to be determined by the committee according to the funds of the Association, on presentation of the original bill of the apothecary endorsed by the local physician and compared with his prescriptions, according to a scale of prices published by the Association. The committee will fix quarterly in advance the available amount to be applied to the aforesaid indemnity, which will be divided equitably according to the whole amount of claims. The allowance will consequently commence from the fourth day of notice given to the foreman. The patient who has gone to a hospital, sanitary establishment, watering place, etc., on the day stated in the notification, will be entitled to an allowance from the first day of the sickness, leaving to his cost the expense of medical attention and recovery. The expense of transporting the sick and wounded to the hospitals falls upon the Association. In the choice of hospitals and sanitary establishments, the physician will give preference to those which afford gratuitous attention; otherwise the daily charge will be confined, if possible, within the limits of the allowance.

The foreman, on receiving a sick report of any man in his charge, immediately notifies the local physician, who visits the case and reports the result of his examination to the sanitary inspector of the district.

The patient who leaves his usual place of residence by permission, must first obtain from the local physician a certificate of sickness and of its probable duration. On this certificate will be endorsed by his succeeding medical attendant the progress of his case and its confirmation by the signature of the sanitary inspector. A claim for relief

beyond the expected duration of sickness, as noted in the medical certificate, will be determined by the committee of the Association.

Whoever simulates disease or adduces false certificates of sickness, and whoever, while receiving sick-relief, engages in any work, forfeits membership in the association together with all contributions paid in; and may be required to reimburse the allowances already obtained, besides other disciplinary measures. Whoever is disabled by disorderly conduct, vice or injuries received in brawls, has no claim to relief. In aggravated cases the director general may demand from the committee summary expulsion of an offender from the association.

The daily allowance to an employé during illness and convalescence, after contribution for one month, is one-third of his daily wages; after two months' contribution, one-half; after four months' contribution, two-thirds of his regular wages.

According to the rules, relief terminates after ninety days of sickness; but the invalid may receive allowance for another period of ninety days during the same year, by decision of the committee, provided the funds of the association allow it. The man's foreman will make a special report upon the claim for this extension of relief.

The record of those injured in service is made upon declaration of their immediate foreman, supported by the certificate of the attending surgeon. The foreman, at his discretion, can have the circumstances of the injury certified by the proper sanitary inspector. Men injured in the line of duty continue to receive wages from their respective branches of service, and consequently have no claim upon the *Consorzio*, except for medical or surgical attendance. In an emergency, whenever the *Consorzio* has anticipated pecuniary relief to those injured in service, or expended money for surgical appliances, hospital charges, etc., reimbursement will be made by the proper branch of service. Employés belonging to the association, whose duties require them to live in marshy and unhealthy localities, subject to fevers or epidemics, have all the privileges of those injured in service. This category includes insalubrity due to such permanent conditions as cultivation of rice, stagnant water, marshes and sewers, which induce endemic or miasmatic diseases. The same applies to those employed in long tunnels, whenever their malady can be attributed to this condition.

The committee in special cases can likewise grant extraordinary allowances once for all: 1. To those suffering from prolonged illness and in absolute want. 2. To those in advanced age or burdened by grave infirmity or rendered incapable of work of any kind. 3. To widows or minor orphans, in case the deceased has contributed to the association not less than three years. 4. To the widow and minor children of an employé deceased through injuries or disease contracted in service will be granted an allowance equal to three months' pay, the other allowances being at the charge of the service to which he belonged, as may be judged equitable. In granting these allowances two-thirds of the committee must agree; and, as in case of allowance renewable from year to year, the committee may require proof of birth, marriage, cohabitation, indigence and death, as the case may be.

After an account taken of the financial standing of the *Consorzio*, every year a fixed amount is appropriated for annual allowances, to be distributed among those entitled to the same according to seniority and contributions made to the service to which they belong. The allowance renewable annually varies from half a *lira* to one *lira* daily, at the discretion of the committee, but only to workmen in the shops and others who, contributing to the *Consorzio* at least ten years, do not belong to the *Cassa-Pensioni*. In the determination of allowances, account will be taken of the length of service of the claimant or deceased, of the widow's age, of the number of minor children, and regard will likewise be paid to their morality. The application for an allowance renewable annually, with copy of the record of the applicant or deceased, must be transmitted to the Director General, as President of the committee of the association, through the proper division-foreman, who will endorse his opinion on the correctness of the statement, and on the petitioner's title to the demand.

Extraordinary allowances, which are renewable annually, always depend on the financial situation of the association, and are revised yearly, regard being paid also to the condition of the beneficiaries. The annual allowances granted by the Mutual Aid Association of Lombardy and of Central Italy, as well as Venetia, will cease to the widow in case of second marriage, and to the orphans on reaching the age of 15 years.

Funeral expenses, to the amount of 30 *lire*, will be paid by the association, on presentation of the death-certificate. In case the expenses fall short of this sum, the difference will be given to the family.

Whoever withdraws for any reason from the company's service or ceases to contribute to the association through increase of pay or change of employment, can not claim reimbursement of his contributions, although he may not have profited thereby.

Applications for relief for days of sickness occurring in different months will not be received on one and the same register.

In the exceptional case of retroactive claim for relief, the immediate foreman must draw up a precise statement of the reasons of the delay, so that the grounds of the claim may be properly estimated.

Whenever it shall be found that relief has been improperly granted, through an incorrect or false declaration, the employé will be held responsible.

(*To be continued.*)

MR. W. D. CHIPLEY, vice-president of the Pensacola and Atlanta road, has issued a circular protesting in a forcible but dignified way against the increased taxation imposed by the State of Florida upon its railroads. The assessment placed by the State upon its railroads is $7,705,209.72, against $4,726,942.40 last year. The assessment of the P. and A. road is $1,610,000. Mr. Chipley thinks that the figures of the current year are oppressive, and discriminate against the railroads.

A LADY writes to a London newspaper suggesting that a clock in the waiting-room of a railway station, is a greater boon to the traveler, than the neat array of texts and Bibles with which that dreary apartment is generally furnished.

The Railroads of Venezuela.

REPORT BY CONSUL BEACH, OF PUERTO CABELLO.

THE following interesting article is from the last number of the Consular Reports, published at the Government Printing Office, Washington:

The first railroad built and operated in Venezuela began at Puerto Cabello and led to the westward, along the strip of land between the Bay of Trieste (the bay is an extension of the Caribbean Sea) and one of the Andean ranges, which varies from one mile to two miles in width. This strip of land is a joint formation produced by a wash-down from the mountains and a wash-up from the sea, and is nearly dead level. When the road was projected, it was with the intention and expectation that it would be extended for a distance of about seventy miles, and in its course to reach one or two interior cities. From the levelness of the route and the sandy character of the soil the work of grading was neither difficult nor expensive. About ten miles of the road was put into operation, and kept in operation for a few months. Financial embarrassment followed; the cars stopped running; the rails were taken up and shipped away, and now nothing visible remains of the enterprise but an outline view of the nearly jungle-overgrown road-bed.

Tucacas is about thirty miles to the westward of Puerto Cabello. From Tucacas to the mines of Aroa, where copper mining is prosecuted, the course is southwesterly, and distance fifty-five and a half miles. Between these places an English company, about the year 1870, built a two-foot gauge railroad, mainly for use in connection with mining. The topography of the country permitted the road to be built in almost an air line, it having but few slight divergencies. The obstacles met with in its construction were many, and some very formidable. For a large portion of the way there were trees of great size, and a dense jungle from twenty to thirty feet in height. From the nature of the obstacles it became necessary that the building and surveying of the road should be conducted in conjunction, and the line of the road was sometimes determined by the compass following those who cleared a place for the track. A severe type of malaria abounded; poisonous reptiles were frequently met with, and tigers and other wild animals were quite numerous. The fertile soil was full of roots, rendering the grading of the road a very great labor. A few small streams were crossed, the largest requiring a bridge of ninety feet span. The bridges are iron structures, the railroad ties are of iron, and even the telegraph poles along the line are of the same material. The road appears to be substantially constructed, and the cars run very smoothly. For twenty-three miles from Tucacas the grade of the road has made an ascent of one hundred and fifty feet. Near the western terminus of the road the mountain is approached, and at the distance of fifty miles from Tucacas the elevation is seven hundred feet. The road for the last five miles has an upward grade of six hundred feet, requiring especially constructed engines for the movement of trains. There are nine stations on the road—all mere stations, except Tucacas, the starting-point, with a population of 1,200, and La Luz, the practical terminus for general business, fifty and a half miles from Tucacas, a village having a population of about 3,000. The freight cars of the road carry from five to six tons, and the passenger cars about thirty passengers. Of late years the road has, in addition to the copper ore, freighted considerable coffee and other general merchandise of the country, coming mainly from Barquisimeto, a city of 29,000 population, sixty miles beyond La Luz, with which it is connected by a coach and cart road. The passenger business of the road is very light.

A railroad from La Guira to Caracas has been in process of construction for several years. The distance by a foot-path over the intervening mountain is eight miles, but by the necessarily circuitous route of the railroad line it is twenty-two miles. Caracas is twenty-six hundred feet above the sea at La Guira; but in passing over the lowest point of the intermediate mountain an altitude of three thousand feet is attained, from which there is a descent both ways. The track of the road is three and a half feet gauge. The grade over the mountain is uniform three and a half per cent. The road is built on a series of reverse curves, having a radius of one hundred and forty feet. Caracas is directly south of La Guira. In starting from La Guira the course of the road is westward, but it circles around to the southward in ascending the mountain, and the whole forms a large semicircle as it reaches its southern terminus. In building the road work was begun at La Guira, and it has progressed from that point. The northern end of the road has been completed for over a year, and is utilized for the transportation of material used in its construction. In recently riding over the coach road between the cities named, which for much of the way is near the railroad line, I was enabled to observe the work as fully completed and as incomplete. Great scientific skill has been displayed in the engineering; the work is well executed; and, judging from the large force of men employed, the road will doubtless be in running order its entire length by the first of July next, the time of opening fixed by its managers, and which is the time set for opening the international exhibition at Caracas—both openings to be celebrated in conjunction. For a considerable part of the way the road passes along the precipitous sides of the mountain, having a surface of earth and shale rock, which is liable to be carried in large quantities upon the track by heavy rain showers, and which will be the greatest obstacle the operating of the road will have to contend against.

Surveys have been made for other railroad lines, and a small amount of grading has been done on a proposed road between Puerto Cabello and Valencia, distance about forty miles, with intermediate mountain elevation of eighteen hundred feet.

IN VALLAMBROSA.—One may remain in the city all summer with social impunity; neither the baths nor the mountains are imperatively prescribed; but it is not "the thing" to be seen there in September and October. Nay, in some of the smaller cities, where the old customs linger longest, the matter is carried so far that those who have no villas, and can not by any means procure an invitation to other people's, deliberately shut themselves up at home with the front shutters closed, and are charitably supposed to be *in villeggiatura* for the period required by fashion. The time of vintage is indeed a charming one in the country; it was just over as we passed through the Val d'Arno, and both masters and peasants looked happy, for it had been a fruitful season, and wine and oil and bread were plentiful.—*Harper's.*

The Formation of Water.

BY W. L. SILVEY.

STRANGE as it may seem, yet it is none the less true that our greatest investigators, such as Darwin, Tyndall, Huxley, Faraday, Davy and others, were often too eager to reach a great conclusion, and therefore often missed the very thing for which they sought. Such seems to be the case with this great and abundant fluid—water—which by its agency has wrought more changes than any other element of our planetary existence. In most cases the investigator acknowledges its being, and after an analysis of its component parts is satisfied to let the subject rest, without stopping to inquire its origin.

Going back into the dim vista of the past, before the earth had a planetary existence, we see an immense mass of incandescent gases revolving on its axis and performing a great planetary circuit in space in unison with the other planetary machinery, varying not a line from its allotted path. This great planet we call the sun. Ages upon ages, and millions of years upon millions of years this great igneous mass sailed in space, lighting up its grand orbit with the electric flame of its existence. How long this continued we are unable to calculate, but in the course of cycles great changes were wrought, and at various periods planets were launched into existence. How this was accomplished, may be determined by the following experiment:

Let a large flexible rubber ball be filled with water, and an axis provided on which to rotate it, so arranged that the walls may approach each other at the axis or poles without losing the fluid. Now revolve it by means of the axle, and the ball will first begin to contract at the poles, expanding at the equator; and if the speed be increased this expansion and contraction will so advance that it will assume a disc or grind-stone shape and finally burst at its equatorial or outer rim. Such was the plan on which planets were formed. First an atom began collecting its neighbors until finally a mass was formed, which became the nucleus for the collection of other atoms and fragments of planets and comets, and the thousands of parts of attenuated matter which constantly pervade space. All the time that this accumulation of atomic gases was going on, the same axial speed of rotation continued, until finally, the equatorial diameter having become very large, the sun assumed a disc shape and the speed became tremendous.

Revolving as the sun does, in a perfect vacuum whose temperature is about 250 degrees below zero, it is evident that the outer surface would gradually cool off, and the centrifugal force would carry the cooled part to the outer rim of the disc-shaped planet until an opaque ring was formed at the equator. After a time this ring, through a series of contractions and expansions, broke at one side, becoming loosened from the core around which it was formed, and by so doing, one part traveling faster than the other, owing to the imperfect contact, the ring is gradually pushed into a solid body and then becomes a semi-solid mass or huge mountain on one side of the gaseous planet. By the constant revolution of the sun, this cooler part was slowly detached from the main body until the last hold being broken, it was launched into space to become a satellite. Space having no gravity, it is evident that the satellite thus formed will be projected a distance proportioned to the speed it assumed while still part of the sun. This accounts for the various distances to which the several planets were thrown.

First, Neptune was thrown off, and its great distance from the center shows that the surface speed was very great at that time. Then in order come the other planets, until Mercury, the last as yet to be thrown off; each one of the planets occupying a position from the sun proportioned to the surface velocity at the time of its formation.

Among the planets thus formed was the one on which we live, the surface speed at the time of its formation being sufficient to project it a distance of about 95 millions of miles. The earth at this time was undoubtedly very intensely heated, enough so in fact to convert into a gaseous form every substance then in existence. Revolve a grind-stone on which water is dropping and at a certain speed the water will be thrown off in drops. Observe the drops thus formed, and it will be found that they assume a rotary motion, revolving on their own axis at a speed a little less than the object which produced them.

On this same principle, the earth received its diurnal motions at the time when it was projected from the sun. After the earth had become a fixed satellite, and continuing its revolutions for some time, it became somewhat the shape of the gaseous central orb from which it sprung—that is of a somewhat discal shape—and a ring of semi-solid matter forming, which was finally broken at one side and pushed together into a huge globule, which, becoming loosened and finally detached, was thrown off to become a satellite for the earth, and this satellite we call the moon. Since a satellite can only be projected into space a distance proportional to the surface velocity of its progenitor, it is evident that the moon could only be thrown from the earth a much smaller distance than the earth from the sun. Hence it was only thrown a distance of about a quarter million of miles.

To account for the great difference of temperature of the earth and the moon, they having been projected from the sun at the same time, and the moon having been evolved from the earth after it had assumed its planetary orbit, it is sufficient to notice the different temperature of the two at the time of the evolution. The ring which formed around the earth and which was finally transformed into the moon as before described, must have assumed a much lower degree of temperature than its parent, or it could not have been formed or projected into space. Since it was so much colder than the earth at the time of its formation, and being so much smaller, it is evident that the moon would become cold a great deal quicker than the earth. When we look at the moon and consider its great frigidity, we can readily imagine the condition which the earth will eventually assume. Of course the moon is not as cold as it will be, for the temperature of space is far below its present temperature, and of course an equilibrium must eventually be formed which will reduce the moon and even the earth to a condition of frigidity which it is difficult for imagination to picture.

Since the moon was at one time part of the earth, it is evident that there was a time when there were both water and air upon it, and as it has been proved that there is at present little or none of either, the question arises, What has become of them?

At the time of the formation of the planetary system

there were a great many more elementary substances than there are now; at that time there might have been thousands, but in the course of cycles (according to temperature and different conditions) the different gases would unite and form new ones, the old or primary ones being entirely destroyed, until to-day we can reckon only sixty-four single elements. How many each one of these may have supplanted, scientific inquiry will probably never unravel, but that every substance which we have is simply a combination of elements may be readily determined. Even the granite pebble, when introduced into the flame of the electric light, will be converted into a gas and may then be analyzed. So it is with every substance of which we have any knowledge; they are simply a combination of elemental principles. As both air and water have disappeared from the surface of the moon, the question arises, What has become of them? When water has been treated with an electric current it is separated into two gases, oxygen and hydrogen, while air is composed of oxygen and nitrogen. From this we see that in order to destroy these two great ingredients of nature, it is only necessary to separate the oxygen from them.

That gases have already been almost entirely destroyed, may be proved by an examination of the coal fields and the lime-stone beds. Were all the gases of which they are composed to be liberated at once, the earth would become unfit for the residence of animal life, and animated nature would soon don the sable robes of death. As our carbonic acid gas has nearly disappeared, and our vast coal fields been laid down, so it is with every other gas; those having the greatest affinity unite, and a new solid or gas is formed according to its specific gravity. In this way the water and air have disappeared from the moon. First one gas formed an affinity for another, they uniting formed a solid. This left the rest to unite with some other for which it had an affinity, until after many changes each gas has been converted into a solid, and finally the planet has become barren, cold and tenantless. *As every substance was at one time a gas, so in time every substance must become a solid.* But how was water formed?

Well, after ages and ages had elapsed, and the planet had assumed a globular form, a gradual cooling process began until a crust was formed. Of course it is not to be supposed that this remained permanent, for occasionally the pent up gases of the interior would crack the thin crust, and large quantities of the molten interior would pour out, which in process of time would cool down to form mountains and mountain ranges; while in other places great depressions would be formed, and in this way the surface was gradually converted into a very irregular form. Change after change having been accomplished, and the earth becoming gradually cooler until a certain temperature was reached, the preparations were complete for the most stupendous effort which nature has made since the evolution from the sun. Heat two gases to a given temperature, combining them in a certain proportion, and they may be ignited and exploded. By uniting oxygen and hydrogen gas in a given proportion, at a certain temperature, they may be exploded by the electric spark, and if they have been confined in a receiver it will be found that water is formed. As long as two gases are heated above a certain temperature they will be too rarified to unite or explode. Hence it was that although the two gases, oxygen and hydrogen, were gradually reduced to proper proportions to form water, yet the temperature was so high as to make the compound too rarefied. Finally the temperature was reached at which it would explode, and one of the fiery meteors which are constantly dropping upon the earth, entering the gaseous cloud, all at once the whole body was ignited with a tremendous explosion.

Methinks I can hear that awful sound; more awful than the combined efforts of all nature's artillery since that eventful day. Grand was the sight! more grand than the united efforts of a thousand Ætnas and Cotopaxis. At its sound the whole earth trembled, and the surface thereof heaved like a billowy sea. Huge rents were formed, into which the mountains melted away. The hills tumbled into the valleys as if by fright, while the crash and roar, and the lightning's flash lent inspiration to the scene. The volcanoes belched forth their shining lava to run down the mountain sides and envelop all in a burnished cloak of liquid fire. High over all, the serpent-tongued flames darted hither and thither, as if it was their mad purpose to lick the very face of the sun himself. Such was the scene which occurred when the two gases, oxygen and hydrogen, united to form water. But the great drama was not yet completed.

It is true water was formed, but the heat which was thereby generated, was so intense as to raise the temperature of the whole earth to a degree that would melt almost every substance; and although water was formed, yet the intense heat was sufficient to maintain it as a super-heated vapor.

During this ferment of nature, many of our rock crystals were formed, and the conglomeration of much of our fine granites took place. The varied effects of these transformations are still visible in Vesuvius, Ætna, Cotopaxi, and more than two hundred other volcanoes which now afford an exit through which the vapor and gas of the interior finds a path.

After things had remained in this condition for a great length of time, the earth began to cool off, and what was at first a vapor then became a light mist that, rising to a great height, would be converted into rain drops which would fall on the highly heated surface of the earth, to be immediately turned into vast volumes of super-heated steam. In fact, a fiery ordeal held high revelry over the surface of the entire globe. In places where the surface had become somewhat cool, the rain would sometimes collect and form shallow seas, but even these were boiling hot.

By-and-by, through a gradual softening and various chemical changes, the bed of these seas would give way, and the boiling water would pour through the rent into the interior. Owing to the high temperature, this would generate vast volumes of steam which, having no outlet, would cause earthquakes, and finally heave up a mountain that would become a volcano through which the pent up steam could find exit.

All nature would quake at the time of these mighty changes. The old volcanoes would belch forth their thunders with renewed vigor, while the new ones, as if in rivalry, would dart their fiery-tongued flames high into the vapory cloud above, as if to quench their thirst with the vapor before it fell. Gradually these great elemental storm changes grew milder and milder as the centuries advanced. The temperature having slowly subsided, the

rains became more copious, until there came a time when a great flood pervaded the whole planet; the vapor rising would be condensed and fall back to keep up the rotation. These floods washing the mountain sides, the various kinds of rock gradually melted away, forming the alluvia; but in so doing the elevated rocks were worn away until the last vestige of high land disappeared beneath the waves of the vast planetary ocean. The winds blew and the lightning flashed, and the thunder rolled, and the waves beat and tossed against each other, but not a vestige of land appeared above the waste of waters.

Until then, not an insect or an animal was formed to behold the battles of nature, but as climatic changes control races of to-day, so it was then; that as nature was prepared for the support of animal life, the germ began to develop which finally culminated in the production of animal life. Of course the first animals were of the most primitive form and habits, but climatic changes so regulated it that from the most simple germ of organism there finally developed the higher forms of animal life.

The race of man is but an improvement over the lower animals as they are over the still lower, each improvement having been brought about by a natural process through the agency of climatic changes.

After the sea had maintained its supremacy for ages, the tides and currents began to perform their work. Then the tiny animal began to sport on the shimmering waves, and as they died formed animal mold to be washed together, and the little coral insects rearing their homes, formed reefs on which the waste matter lodged, until islands were formed, and finally continents began to appear. The animal mold by being mixed with the disintegrated rock formed soil, and at last a flower here and there, and then little shrubs, and finally great forests adorned the surface of the planet.

Then in process of development, little bees began to hum and sip the sweet nectar from the sweet scented wild flowers, and the chirp of the little bird and the song of the nightingale made the vast sylvan solitude redolent with the sweet notes of joy. Then in the vast natural procession came the animals, one after another, each in its proper place, and at the rear of all this natural pageant we see a being called man who is simply a result of climatic changes, animal development and natural adaption. Of course man of to-day does not occupy the extreme rear of creation, for *there will be a higher animal than yet exists*, which will be simply a development over previous organisms. The superfluous organs will be discarded, and the future being will be fitted to enjoy his situation of superiority, throughout the ages which shall elapse during his reign of a cycle of the boundless time of eternity.

When we see the dew upon the verdure and hear the patter of the rain drops, and see the spring gushing out of the rocks, and the merry rill go murmuring along, and the roaring cataract in the mountains, and the mighty river coursing its way to the sea, and see the steam issuing from the ponderous engine, we can reflect on nature, for her ways have been ways of grandeur and sublimity.

The water which now enlivens our industrious machinery and beautifies our land, has had an eventful and varied existence, and has been one of the most ponderous agents in the performance of nature's great ultimate purpose.

CASTLETON, IND., July 18, 1883.

Economy and Speed in Railway Service.

THE address of Mr. Percy G. B. Westmacott, as reported in *Engineering* of July 27, 1883, is too long for reproduction in these columns, but what he had to say about railway matters is highly interesting and instructive, and we are glad to quote, as follows:

"It is surprising how soon the speed of the locomotive was brought up to something approaching its present limit. George Stephenson was laughed at in 1825 for maintaining that trains would be drawn by a locomotive at twelve miles an hour, but the Rocket herself attained a speed of twenty-nine miles an hour at the Rainhill competition in 1829, and long afterwards ran four miles in four and one-half minutes. In 1834 the average speed of trains on the Liverpool and Manchester Railway was twenty miles an hour; in 1838 it was twenty-five miles an hour. But by 1840 there were engines on the Great Westerd Railway capable of running fifty miles an hour with a train, and eighty miles an hour without. In 1841 we find Stephenson himself ranged on the side of caution, and suggesting that forty miles an hour should be the highest regular speed for trains. Now, it is a remarkable fact that the highest speed at which locomotives run in ordinary practice, scarcely seems to have been raised during the last twenty-five years; on the other hand, the weight of the trains has been perhaps doubled. Although the average running time of express trains has in many cases been improved, this has been almost entirely due to their making fewer stoppages. At the same time the speed occasionally attained is very great. Engines on some of our principal lines have repeatedly run fifteen miles in twelve minutes, or at a speed of seventy-five miles an hour, and express trains run regularly at fifty-three miles an hour. It does not follow, however, that there is never to be any increase in the speed of trains, and it seems a point well worth consideration in what way the time of transit between important centers of trade can be shortened.

What are the causes which have tended to prevent any improvement in this particular? In the first place, it may be said that the permanent way would suffer seriously by further increase in speed; but this could surely be overcome in time by improving the permanent way itself, which also remains very much in the same condition and of the same construction as it was twenty-five years ago. Again, it may be said that the running at a higher speed would require more powerful engines, and hence that trains now worked by a single engine would require two, or would have to be split up into two trains at a great increase in running expenses. This, however, assumes that it is not possible so to improve the engine that it shall be able to exert a considerably higher power without an inadmissible increase in weight. By utilizing a larger part of the total weight of the engine as adhesion weight, it would be easy to obtain the amount of adhesion required for the increased tractive force; and for this purpose Mr. Webb's compound locomotive, which enables the number of driving-wheels to be increased without the use of coupling rods, appears to merit particular attention.

Another point in which improvement may possibly arise in the future should be noticed. On the Russian railways, where both coal and wood are dear, the burning of petroleum has now taken a practical form. Our member, Mr. Thomas Urquhart, has been very successful in this

direction, and is now running locomotives regularly which use only petroleum refuse, and which show a marked economy over coal or wood. To test the point, he prepared three locomotives of exactly the same type, and started them on successive days under exactly similar conditions of weather, train, and section of road. The trips were made both ways, and the results per verst, including fuel required in lighting up, were as follows:

	copecks.
Anthracite, 52.9 Russian pounds, cost	26.35
Wood, 0.0107 cubic sashin, cost	23.54
Petroleum refuse, 27.36 Russian pounds, cost	11.64

There is thus in this instance an economy of at least fifty per cent. on the side of petroleum, the boiler pressure being from 120 pounds to 130 pounds, and the gross load over 400 tons. At the same time the weight of fuel used, as against coal, is diminished by about fifty per cent., which is a most important item."

The Railway Field in Mexico.

UNDER the above title a writer for the Pennsylvania *Ledger* has published a well-informed article, from which we give a few of the principal facts:

The comprehensive national railroad system of Mexico, as originally planned by her political leaders—and planned before they granted out the several concessions—may be roughly outlined as follows: Three transcontinental or east and west trunk lines, with two north and south trunk lines. This for the country northward of the city of Mexico, which is the bulk of the republic. For the rich triangle southward from the city of Mexico to Guatemala a little system of its own was laid out, giving it outlet to Atlantic and Pacific ports and down the Isthmus, to connect in time with the South American system.

The three transcontinental trunk lines above mentioned belt the republic successively from Tampico to Mazatlan; from Tuxpan to San Blas; from Vera Cruz to Manzanillo. The southern system provides for a fourth and more southerly transcontinental route, namely, from the city of Mexico west to Acapulco. The north and south trunk lines strike out from the city of Mexico to reach respectively El Paso, in the territory of New Mexico, and Laredo, in Texas, at which points they enter the United States and connect with our systems. To this system was added afterwards another line, from Laredo to the city of Mexico, running nearer the coast and along a lower bench; the Huntingdon line, which runs from Eagle Pass to Durango—swinging thence by a curve across to the city of Mexico; the Topolobamba line from Eagle Pass to Topolobamba; and a number of branches, including an important subsidiary north and south line from Guaymas directly northward to the United States. This plan gives every State in Mexico, except the two small and remote States of Campeche and Tabasco, one or more lines, and one direct railway communication with the capital.

When the several sections of this system were let out to foreign *concessionaires*, the north and south line from El Paso to the city of Mexico, with the transcontinental line from Tampico to Mazatlan, fell to the Central Company, organized in Boston; the north and south line, from Laredo to the city of Mexico, with the transcontinental line from Vera Cruz to Manzanillo, fell to the National Company, organized in New York, but with Philadelphia conspicuously represented in its management and capital. The transcontinental line to be built by this company runs out from the city of Mexico to Manzanillo; the section from the city of Mexico to Vera Cruz having been already built by an English company. Both of these companies—the Central and National—have made rapid and substantial progress in carrying out their contracts with the Government. They both accepted their concessions in September, 1881, began work on the ground in October of the same year, and have now between them some 1,600 miles of road constructed. Together they have put into the work probably over $60,000,000 in gold.

The whole railway mileage of Mexico is 2,779, of which 932 are three-foot guage. The Central and National are each laying track continuously from four or more points, and there is a fair possibility that both of them may have through routes to the city of Mexico, by the end of 1884. In May of this year the concessions of the Lower Bench Laredo line, and of the Mexican Southern Company were consolidated in a new concession, and General Grant was elected president of the united system. Under the terms of the new concession, work of construction had to begin by July 14th, and work was so begun. The railway field of Mexico is simply an extension of the railway system of the United States. Mexican railroad tables appear now every month, without a word to indicate, unless it is suggested by the title, whether the railways are in Mexico or in the United States of America.

Things Worth Knowing.

BY F. B. GARDNER.

THERE are but few who do not fully appreciate the value of information regarding any trade or profession closely allied to the one they themselves follow. And who, let me ask, is more anxious to know the ins and outs of the painting of railway cars than he who superintends their construction, providing, of course, that he is not a painter? He may have faith in his foreman painter, and also have a close eye upon the workmen himself, yet he must be more intimately acquainted with details in the work than that, in order to conscientiously perform his duty. In our experience of over thirty years we have frequently been approached by persons holding good positions in car shops, inquiring what opinion we held regarding certain things connected with painting railway cars, such as:—Were light colors or dark colors best? Was it the correct thing to apply two or more coats of finishing varnish to the outside of a car instead of applying more paint, or undercoats of varnish? Would gold wear better if put on dead color than if put over varnish or color-and-varnish? Was the varnish used on the outside of cars as suitable for locomotives, or was there something better for these machines where heat and smoke, dust and oil were the destroying agents? Should oil as coming from the waste used in cleaning the metal parts be wiped over the painted and varnished work? and a hundred and one such questions which, it seemed to them, were of vital importance in their every-day experience, but which they were unable to study out, and yet disliked to show any lack of knowledge of to those higher in power than themselves, or to lower their standard with those below them by inquiring about things which they believed they ought to know.

The exact answers made by me at that time I am now unable to repeat, but it is my intention to give my views on several of the various questions, having been assured that they were yet of interest to all concerned in railroads. There was quite a lengthy discussion in the trade journals some time ago, regarding light and dark colors on cars, and I was fortunate enough to secure quite a number of the articles that then appeared, but was unfortunate enough to lose all that valuable data in the fire which destroyed this magazine; therefore I must be brief in this article, as I have not time to work out the subject as it was then done. I repeat the assertion that there is no reason why dark colors should not be as durable as light colors, if the work be properly done.

Much has been said and written in regard to white lead, used either as a priming or as color, and the omnibus or stage builder and the carriage builder well knows how difficult it is to make a white job to stand. A white hearse, for example, will go to ruin in a short time, while the black one standing beside it will last several years.

The foundation coats for a light color must be of a different color and nature from those on which a dark color is to be put, and that has something to do with the more speedy decay of light colors than of dark ones. It requires several coats of a light color to cover solidly, while in some cases *one thin coat* of a dark color will suffice; and every painter will concede the fact that the thinner the coat of paint, to make the work smooth and well covered, the better it will wear. The "Pullman color," as it is called, is a dark maroon or brown, and it stands well. The elevated roads in New York City have discarded the light green for the dark red and olive. And in answer to the question, "Which is better, the light or the dark," I should invariably say, *the dark*. In regard to the varnishing of cars by what is called the "repeating process," *i. e.*, the application of two or more coats of finishing varnish, at intervals of from twenty-four to thirty-six hours between each, is one of those questions which, like politics, calls out two or more sides or different beliefs. Mr. A. P. Sweet, at the Master Car Painters' convention, read a paper in which he favored the repeating process, and there were many in the audience who agreed with him, and said it was their practice, while some derided the idea; and now, as it has become a feature of some considerable importance, I am inclined to await further developments by writers to this or other like papers; but I certainly endorse the plan of putting on two coats of railway finishing instead of two or more coats of rubbing varnish. One reason is, that there is a *thicker* coating of paint and varnish—which is hard and brittle, perhaps,—when so many rubbing coats are applied, and a *thinner* coating of paint and varnish when two coats of finishing are put on, and not that liability to chipping, etc., the thin coating being more elastic. Remember the rule! "The less paint and varnish to make the surface all right, the better."

It has been tested and proven in many cases by the leading wagon makers of New York and vicinity, that gold put on over *dead color* will outwear that put on over color-and-varnish by one-half, though there are few who practice it, owing to the dislike of their workmen to do so. The size does not flow from the pencil as nicely, and their color must be finer than otherwise, else the gold would show the grain. There are many things in painting we may know to be good, but being inconvenient we pass them by.

The varnish for cars is called "Railway Coach Finishing," while that for locomotives is called "Locomotive Finishing." The latter is made expressly to fill a want, discovered by the varnish manufacturers after many years of study, and is the best where heat, dust, etc., are at all times endeavoring to destroy it, but it would not be so durable on the outside of cars.

The oil from the engineer's waste is certainly beneficial to a certain extent, but he should wipe the varnish as dry as possible. The oil goes to feed the varnish on the heated machine, and being absorbed, gives elasticity where none would be in a certain length of time, if this was not done. This may be seen on locomotives that are being continually wiped over by a tidy engineer or fireman. While on the other hand, a slovenly or lazy engineer and fireman will soon have a dingy-looking locomotive.

Having run rapidly through the questions, I intend to follow this paper with items of a similar character, and in doing this I shall be pleased to have assistance from any brother of the brush who feels disposed to tell of things worth knowing.

Railroad Gardening.

The traveler in England finds that the railroad stations, however small, are in marked contrast with similar stations in this country. Instead of the usually desolate appearance, often increased by accumulations of old ties and other railroad rubbish, seen at home, the grounds surrounding the station house are laid out and kept with all the care given to a private garden. So excellent an example has extended to this country, and one of the railroads running south from Philadelphia has for some years employed an experienced gardener to superintend the planting and care of the grounds around its numerous depots. The present season, the grounds surrounding the signal houses, on both sides of the Bergen Tunnel, have been put in order, and large ornamental beds planted. These beds are in the "fire-works" style, but we are not disposed to criticise so long as something is done to relieve the former desolate appearance. It would be vastly better for each road to employ a competent person to lay out and plant the grounds around its stations than to leave this to the fancy of the station-masters. So far as we have observed, when the plantings are thus left, efforts are directed entirely to immediate effect. Areas are devoted to the usual bedding plants, but no provision is made for the future. A competent superintendent, while he would not neglect the bedding-plants, would set out ornamental trees, flowering shrubs and hardy perennial plants. With these the surroundings of the stations would increase in beauty from year to year, and with a proper selection of hardy perennials, the need of an annual renewal of bedding-plants becomes thereby greatly reduced.

Another matter, much regarded in Europe, but little considered in this country, where it is much more necessary, is the planting of climbers around station buildings. The passing traveler has but a few minutes, at most, to notice such improvements, and nothing is more striking than to see the buildings draped with climbing vines. Besides beautifying the surroundings of the stations, in some parts of France and Germany, the sides of the rail-

way embankments have been turned to account by devoting them to the the cultivation of fruit trees of various kinds. The embankments on some of the roads in this country present a large area, which in time will produce something—usually a crop of weeds. If the embankments are not suited to fruit culture, they may generally be made useful by sowing them to grass; which, besides keeping down the weeds, would render good service in binding the soil and preventing sudden "washouts." Some years ago the traveler over one of our Middle State roads must have noticed the vegetable patches attached to the cabins of the road tenders. These were often examples of excellent culture, and served to show how the wasted land along the roads might be utilized. Land will not always be so cheap in this country as it is at present, and our railroad companies will find it to their interest to utilize a vast area that now goes entirely to waste, by planting trees and shrubs.—*American Agriculturist.*

POOR'S RAILWAY MANUAL, just issued, says that the railroad mileage at the close of 1882 was 113,329 miles, 11,591 having been constructed during the year. The average mileage operated for the year was 107,158. The amount of share capital issued by the several companies up to the close of their respective fiscal years was $3,456,078,196, an increase from the previous year of $385,254,585. The funded debts of the several companies amounted to $3,184,415,201, an increase from the previous year of $352,554,496. Their floating or unfunded debts amounted to $255,170,962, an increase of $42,404,965. The total increase of share capital and of funded and floating debts from the previous year equaled $780,213,776. The total amount of all liabilities at the close of 1882 was $6,895,664,359. The total per mile for completed mileage was $61,342. The total of stock and liabilities for 1881 was $6,115,540,583; the amount per mile, $57,730. The total for 1880 was $5,373,015,928; per mile, $58,949. The total for 1879 was $6,872,017,517; per mile, $57,730. Gross earnings of all the roads for their several fiscal years of 1882 were $770,356,716, an increase from the previous year of $67,066,511.

SPIKES.

PRESIDENT JEWETT passed through Port Jervis the other day, and the Erie employés at that place had a good opportunity to see him. "And so that is the president of our road," said a witty flagman. "Well, I'm blowed if I wouldn't like to exchange jobs with him, and do the work for the same pay. You see, I could do his work, because I could obtain lots of talent to help me; but I doubt very much if he could or would run back half a mile over a slippery track, with the thermometer down to twenty degrees below freezing, to save a rear collision. Talent, you see, runs in different directions; mine is in my legs, and Jewett's is in his head. That's all the difference between him and me."

"PORTER, wake me at Harrisburg," and the passenger in the chair car dropped half a dollar into the colored man's hand. At Altoona the porter shook the passenger and said: "Boss, we's jes' half way to Harrisburg now." "Well, what are you waking me for?" "You see, you done gimme half a dollah, sah, an' dat's twice as much as mos' men gimme, so I thought I'd gib you two wakin's fur it, one hyar and one at Harrisburg."—*Every Evening.*

"That fellow had a monstrous foot, the biggest I ever saw." "How large?" asked the general. "Give us some idea of its size?" "I don't know that I can, but I will tell you what's a fact. His foot was so big that—well, you have heard the old story of the fellow who used the forks of the road for a bootjack? Yes; well, Nick tried it, and split the road so far that the geography of the neighborhood was changed."

TWO girls while walking out the other day came to a ditch near the railroad grade which they did not know how to get over. Seeing a young man coming along the road they appealed to him for help, whereupon he pointed behind them with a startled air and yelled out "Snakes!" The way those girls crossed that ditch was a sight to behold.

"I'm railroading now," said a young man as he shook hands with a friend in the Globe Hotel recently. "I occupy the position of second conductor." "What is the difference between first and second conductor?" was the query. "Why, you see, the first conductor starts the train, and the second one stops it."

A COLLECTOR once wrote to General Sherman for his autograph and a lock of his hair, and he answered by letter," "The man who has been writing my autographs has been discharged, and as my orderly is bald, I cannot comply with either of your requests."

THE principal of an inland temple of learning saw fit to expel one of his boys, who then wrote home to his father in justification of his course: "I got expelled for riding with the girls, but I took the neatest, cleanest, prettiest girl there was in town."

THERE is a story going the rounds of the papers of a little girl who was about to put a penny in the missionary box, and being requested to repeat a verse of Scripture while dropping her gift, said: "Fools and their money are soon parted."

"HUSH! Beware of the torpedo!" said a young lady to an ineligible admirer, who was becoming too attentive. On his asking for an explanation, she answered: "Oh, its only our new name for mamma, because she blows us up so!"

THE cost of stopping a train of cars is said to be from 40 to 60 cents. But it wouldn't do any good to hold up half a dollar to the brakeman on the rear end of a train you have missed, as it goes out of the depot.—*Lowell Citizen.*

A SUBSCRIBER to a southwestern newspaper died recently, leaving four years' subscription unpaid. The editor appeared at the grave and deposited in the coffin a palm leaf fan, a linen coat, and a thermometer.

MRS. HOMESPUN, who has a terrible time every morning to get her young brood out of their beds, says she cannot understand why children are called the rising generation.—*Boston Transcript.*

A MAN writes to an editor for $4 "because he is so terribly short," and gets in reply the heartless response. "Do as I do; stand upon a chair."

THE latest cigar is named "The Mother-in-law." You set it on fire with a match, the same old way.

Financial.

THE writing of a financial article has become rather a tame and monotonous affair. There are no startling changes to record, and the stock market resembles more than anything else, the old see-saw plank on which we used to play when boys. When stocks begin to go down then the operators begin selling short as long as they dare, when they turn round and buy to cover, and stocks rise in consequence. When they have covered, the market becomes dull again until some one inaugurates a bull movement. It is safe to state, however, that the operations on Wall street have very little effect on the outside public. The rank dishonesty that has marked dealing in stocks, in which brokers and those inside the ring fleeced the public, has seemingly brought the result of driving the public away from speculation, thus leaving the brokers with only each other to fleece. The latest ripple on the financial sea was the defaulting of the Ohio Central Railroad on its River Division first mortgage bonds. The *Chronicle* thus gives the history of this road:

"The active existence of the company may be said to date from the 1st of January, 1880. The prospectus issued at that time presented things in a very pleasant way. The road was to become a prominent carrier of bituminous coal in Ohio, and particular stress was laid on the fact that the Columbus and Hocking Valley, and Columbus and Toledo roads, having 230 miles, had together paid 7 per cent. on 5½ millions bonds and 8 per cent. on 3 millions stocks in the year immediately preceding. Of course, the new enterprise, starting in such auspicious times as then prevailed must outdo the old rival in some way, in order to be better prepared to share with it the business; so instead of 5½ millions bonds, as on the Hocking Valley roads, the Ohio Central was given 6 millions, (3 millions first mortgage bonds and 3 millions income,) and instead of 3 millions stock it was given 4 millions. This worked so well, apparently, that it was concluded to try operations on a larger scale. The road having been built for the coal business, the coal lands furnishing that business had to be secured, and the Ohio Central Coal Company, owned and controlled in the same interest as the Railroad, offered a convenient means of obtaining them. Accordingly, the two companies were merged into one in January, 1881, and the capital of the Ohio Central Railroad inreased from 4 to 12 millions. Previously the railroad had also provided itself with a terminal mortgage for $600,000, in keeping with the spirit of the times. But as yet the line ran merely from Toledo to Hadley Junction and Columbus;—it must go on to the Ohio River and into West Virginia. The Mineral Division, having $300,000 1st mortgage bonds and $300,000 income, supplied the initiative in this direction, but soon gave place to the more ambitious "River" Division of 150 miles, from Corning, Ohio, to Charleston, W. Va., lately completed, with its $7,000,000 1st mortgage, $4,000,000 incomes, and 10 millions stock. It is on the mortgage bonds of this division that default is now to be made. Three millions of these bonds are meant to retire $2,550,000 Ohio Central Company bonds and also the $600,000 Mineral Division bonds, but the total amount is as stated, and includes the bridge across the Ohio. That modern contrivance, however—the car trust—has also found lodgment in the bosom of the concern, for we see that there are trust certificates No. 1 to amount of $360,000, and car trust certificates No. 2 to amount of $1,750,500, together $2,110,500, both bearing interest at the moderate rate of 8 per cent. per annum. Thus there is now 22 millions of stock, 10 millions of 1st mortgage bonds, $600,000 terminal bonds, $2,100,000 car trusts, and 7 millions of incomes—all on a road of less than 400 miles.

Some people are unkind enough to present this as a fair sample of railroad properties in general, which cannot be the case, as some of our most badly watered stocks have done well by their stockholders.

The New York Central and Harlem River Railroad issued watered stock in 1867 and 1868 to the tune of $47,000,000, on which they have been enabled to pay 8 per cent. dividend annually, which for the 13 years intervening amounts to $52,640,000, independent of interest. Add the interest to these annual dividends, and holders of this watered stock will have received in 13 years over $80,000,000, or nearly twice as much as the face value, and still have the stock left on which to receive more dividends in the future.

The following corporations of New York State have reported to the State Comptroller at Albany, the amounts of their earnings within the State of New York for the year ending June 30, 1883, as follows:

Companies.	Gross earnings.	Tax levied.
New York Central	$28,929,444 72	$144,647 22
Boston and Albany	1,069,412 48	5,347 06
Utica and Black River	815,472 11	4,077 36
New York Central Sleeping Car	405,381 87	2,026 90
Delaware, Lackawanna and Western, lessees U. C. and B. and R. and C. roads	146,485 44	734 42
New York and Harlem	670,950 26	3,354 75
Delaware, Lackawanna and W. as lessees	3,160,032 18	15,800 16
Lake Shore	1,021,401 75	5,107 00
Southern Central	508,480 14	2,042 40
Boston, Hoosac Tunnel and Western	319,520 67	1,597 60
Manhattan	6,245,589 70	31,227 94
Buffalo, Pittsburgh and Western	511,493 51	2,557 49
Syracuse, Chen. and New York	94,234 34	471 17
Syracuse, Bing. and New York	1,019,603 59	5,098 81
Sodus Bay and Southern	47,001 99	235 01
Newburg, Dutch. and Conn	149,828 30	749 14
Elmira State Line	55,638 45	278 29
Elmira, Jefferson and Canandaigua	375,749 04	1,878 74
Elmira and Williamsport	77,517 95	387 54
Chemung	202,404 42	1,012 02
Genesee Valley Canal	7,811 80	39 06
Olean, Brad. and Warren	60,571 91	.....
Greenwich and Johnsonville	33,972 84	169 86
Adams Express Company	11,738 11	58 69
Albany Railway	132,827 99	664 14
New York, Chicago and St. Louis	134,989 45	674 95

There is no question but that there is an abundance of money, because it is so readily obtained at a very low rate of interest on call when the security is first-class. Still parties wishing to borrow on 90 days are willing to pay as high as 6 per cent., and find hard work to negotiate even at this rate. The reason for this condition is to be ascribed to the timidity of capitalists who are apparently waiting, feeling that the unexpected is always liable to occur. They prefer to take a very low rate of interest with undoubted collateral as security, than have the unexpected suddenly come upon them, and they not in a condition to meet it. The capitalists seem to be justified in taking this position when we look at the commercial world, which in the two large auction sales of dry goods aggregating some $3,000,000, gives evidence that there has been a great over-production in this country.

In reviewing the whole situation as carefully as we can, while not claiming to be prophets, we can advise our readers that money invested at 4 per cent. is safer than if placed on securities paying a higher rate.

TRADE NOTES.

THE railway velocipede made by the Kalamazoo Railroad Velocipede Company, of Kalamazoo, Michigan, having a driving wheel on each track, is equally balanced by the weight of the operators and cannot be accidentally upset; it is propelled by the hands and feet and may easily be operated by either one or two men, the motion being the same as in rowing. No matter at what speed it may be driven, there is no danger whatever in making curves, and, being provided with a brake conveniently located, the car can be readily stopped in a distance of eight or ten feet. The axle revolves under friction rollers four inches in diameter, whereby the amount of friction is greatly lessened and the car is consequently propelled with much greater ease. This is a feature peculiar to the velocipede under description. A speed of twenty-five miles an hour has been made on these velocipedes, although a rate of from fifteen to twenty miles per hour is all that is claimed. In their construction, the utmost care is exercised to secure strength and durability. The axle is cast steel, wrought-iron truss, and one inch trailing-bar; there is no wearing of wood, no getting loose and rickety, and no worming around of seat on uneven tracks.

The Pittsburgh *Commercial Gazette* says: A new process is in course of introduction at the Edgar Thomson Steel Works which will materially lessen the cost of producing steel rails. Last January the method of blowing the metal as it came from the furnace, instead of putting into pigs and remelting, was put into practice, and to this is to be added the soaking pits. In these the ingots, as soon as they are cool enough to leave the mould, are placed, and by the heat held within them they are brought to a uniform degree of heat, and rails are made with one heating of the metal. This method has been successfully used in England, and will be used here in the course of six weeks or two months. The saving will be from $1.50 to $1.75 per ton. Some of the Western papers place the figure at $5, but they are away out in their reckoning.

THE United States Mineral Wool Company, New York, has received, during May and June last, orders for 261,000 pounds of ordinary mineral wool to be used in passenger cars. Thirty thousand pounds were ordered by the Ontario Car Company, of London, Ontario; 10,000 pounds by J. G. Brill & Co., of Philadelphia; 24,000 pounds by the Chicago and Northwestern, and 27,000 pounds by the Gilbert Car Manufacturing Company, of Troy, New York; while three separate orders, for 10,000, 40,000, and 120,000 pounds respectively were received from the Pennsylvania Railroad Company.

THE Union Switch and Signal Company of Pittsburgh, Pa., manufacturers of railroad signaling appliances of all descriptions, frogs, crossings, switches and switch-stands, have recently published three pamphlet catalogues of their goods. These catalogues are masterpieces of the printer's art, being printed on heavy paper, illustrated with numerous cuts and plates, and form on the whole the most expensive trade list we have ever seen. The intrinsic value of these magnificent publications will insure their permanent preservation by all who have the good fortune to receive them.

THE Schenectady Locomotive Works are completing orders for 25 freight engines, 17 x 24-inch cylinders, for the Chicago and Alton; four consolidation engines, 20 x 24-inch cylinders, for the Kentucky Central road; eight passenger engines, weighing 45 tons each, with 18 x 24-inch cylinders, for the Canada Southern Division of the Michigan Central. They have lately taken orders for seven Mogul freight engines, with 19 x 24-inch cylinders, for the Lake Shore and Michigan Southern, and 45 freight engines, with 17 x 24-inch cylinders, for the Chicago and Northwestern.

THE car works and car wheel companies of Knoxville, Tenn., were recently awarded the contract for furnishing the East Tennessee, Virginia and Georgia Railroad with 500 standard box cars. The contract, including the castings, will aggregate $250,000, which is a handsome sum to keep at home and distribute among the Knoxville mechanics. Knoxville is only one of many Southern cities now coming to the front as manufacturing centers.

E. Y. BELL, proprietor of the Patent of "Bell's Ventilator for railway closets," heretofore referred to in the JOURNAL, has granted licenses for use of the closets on the Pennsylvania R. R., the Northern Pacific, the New York, Lake Erie and Western, and the Oregon Railway and Navigation Co. Mr. Bell is now in negotiation with the West Shore and also the Union Pacific, for its adoption.

WORKMEN of the Jackson & Sharp Company are finishing one of the finest pieces of workmanship ever turned out of the shops of that firm—the palace hotel car Edwin Forrest, built for the Worcester Excursion Car Company, of Worcester, Mass. The car is the fourth one of the kind constructed for the company, and is complete in even the minutest details.

THE Pennsylvania Schuylkill Valley Railroad has contracted with Coffrode & Saylor, of Pottstown, for seven iron plate girder bridges to be used on their line. The contract is a very large one. The Manayunk Bridge contract will be let on Wednesday and the Phœnixville within a few weeks.

CHAS. W. PICKERING & CO., of Philadelphia, manufacturers of railway springs, have opened a branch office in Room 45, Boreel Building, 115 Broadway, New York, under the management of A. L. Rowe.

THE Harrisburg, Penn., Car Manufacturing Company are building twenty of the Burton improved stock cars for the Burton Stock Car Company, of Boston, Mass.

THE New York and New England has received three splendid passenger coaches from J. G. Brill & Co., Philadelphia, and seven more will soon arrive.

THE Baltimore Locomotive Works are building ten locomotives per week. These works are employing 2,800 men.

THE Fullerton Car Works are working on a 100 car order for the Toledo and Indianapolis Railroad.

LITERARY NOTES.

THE Preliminary Report on the Foreign Commerce of the United States during the fiscal year ending June 30, 1883, shows the total value of the imports and exports of merchandise during the year to have been $1,546,928,485, being larger than during any previous year in the history of the country. The value of exports exceeded that of imports $100,683,153. Mr. Joseph Nimmo, Jr., compiler of

this little pamphlet, shows in its compilation as indeed in all his work as chief of the bureau of statistics, his eminent fitness for the position. The Preliminary Report is issued from the Government printing office, Washington.

NATIONAL pride in the appearance of American trade Journals finds gratification in the examination of *The American Artisan, Times and House Furnisher*, a monthly, published in Chicago, of whieh the number for September lies before us. We are much pleased to record that our contemporary is replete with evidences of prosperity, its reading matter and reports being organized and comprehensive, elegantly printed and illustrated, and accompanied with advertisements scarcely less valuable to the discriminating reader, because presenting, by means of both pictures and letter press, a faithful showing of the stage of development which the various interests represented have so far reached.

Dio Lewis's Monthly is not as lame as it looks, but tedious enough, though it contains some reading at once light and instructive, and is printed in luxurious old-style type, on paper with a "dead" surface. The trouble with this new magazine is, that it is too Dio Lewis-y. Most conspicuously, the name of the great man appears at the head of every page, announcements of his benevolent business enterprises are the chief feature of the space devoted to advertising, and cuts and letter-press throughout, alike remind the reader of the great apostle of farinaceous food. *Dio Lewis's Monthly* gives one mental indigestion.

WE can spare just one line in commendation of the Souvenir edition of the Eleventh Cincinnati Industrial Exposition, 1883, issued by the enterprising publishers of the *Baltimore Manufacturers' Record*. This number appears in special form, being arranged in a gorgeous colored wrapper, presenting two views of the Exposition Building, and a pictorial allegory of a pleasing character. The first article contains an account of Cincinnati and her Expositions, the next of which, by the way, will last from September 5th to October 6th.

THE September *St. Nicholas*, both in its pictures and reading matter, most assuredly answers the requirements of the most exacting boys and girls. It contains good reading for children of all ages, from little tot to the big brother who begins to speak in a gruff voice. The best of the illustrations are all that can be desired by the critical.

CARE OF SICK OR INJURED EMPLOYES.—A system has recently been established by the Denver and Rio Grande Company by which every employé shall receive care and treatment for injuries received, or sickness contracted while in the service of that company. Local physicians and surgeons have been appointed at stations at equal distances apart, and the entire system of treatment is under the care and supervision of one general surgeon at Denver. A "conductor's emergency chest" is furnished each train, containing suitable remedies and instructions applicable to the various accidents liable to happen. Hospital accommodations are provided at five different points along the line, where patients will be cared for if they have no suitable home to go to. For the maintenance of this system and to meet the expenses connected therewith, an assessment of fifty cents is made monthly, and deducted from the wages of each employé at the time of drawing his pay. If the employé works less than half a month, only twenty-five cents per month is deducted; if over half a month, the full amount. Medicine supply stores are also stationed along the line.

WEALTH OF THE CHICAGO AND NORTHWESTERN.—This road has $39,175,720 in stock and $69,821,000 in funded debt, most of which is at 7 per cent. In undistributed assets and stock it has, says the Financial Chronicle, Unissued stock owned by company since May 31, $622,615; exchanged since for Elgin and State Line and Chicago, Milwaukee and Northwestern stock, $9,765,100; stocks of other proprietary roads held, $12,692,500; land income balance, $1,033,565; surplus income account, $8,425,862; total, $32,539,642. Here we have a total of undivided assets and surplus in the large sum of $32,500,000. Should the company determine to distribute it all, which of course is not likely, in the shape of a stock dividend, stockholders would be entitled to an increase of 84 per cent. in their holdings. Even leaving out the surplus income and the land balance, and supposing all the proprietary road stock exchanged, there would be full 23 millions of unissued stock at the disposal of the Chicago and Northwestern company.

THE official statement of the business of all lines of the Pennsylvania Railroad Company east of Pittsburgh and Erie for July, 1883, as compared with the same month in 1882, showed a decrease in gross earnings of $18,200, an increase in expenses of $136,159, and a decrease in net earnings of $154,359. The seven months of 1883, as compared with the same period of 1882, show an increase in gross earnings of $1,683,533, an increase in expenses of $1,509,188; an increase in net earnings of $174,345. All lines west of Pittsburgh and Erie for the seven months of 1883 show a surplus over all liabilities of $309,690, being a decrease as compared with the same period of 1882 of $45,340. The statement that the Philadelphia and Reading Railroad Company have defaulted upon certain payments is declared at the office of the company to be untrue.

PRESIDENT ARTHUR has appointed D. D. S. Brown, of Scottsville, N. Y., George G. Wright, of Des Moines, Iowa, and William S. Furay, of Columbus, Ohio, as a commission to examine and report upon seventy-five miles of the Northern Pacific Railroad in Montana. To examine forty-two miles of the railroad in Oregon and Washington Territory the following named commissioners have been appointed: William H. Beard, of Brooklyn, Richard M. Galloway, of New York City, and Alonzo Bell, of New York.

FASTEST TIME YET IN CANADA.—Readers will remember that a few weeks since the Canadian Pacific Railway advertised to run an express train between Montreal and Ottawa, a distance of 120 miles, in two hours and fifty-five minutes. The Canada Atlantic, a competing line running in conjunction with the Grand Trunk, not to be outdone, advertised to make the run in two hours and twenty-nine minutes, and this has been carried into effect. This is the fastest time made over any Canadian road.

Tramway.

THIS department of the AMERICAN RAILROAD JOURNAL is devoted to the interests of Street Railways; and communications, suggestions and items of information relative to their organization, management and appliances are solicited by the editors. All communications should be accompanied by the name and address of the writer. The English nomenclature of "Tramway" is adopted in this department as being of greater convenience and more specific in its meaning than "street railway," though in allusion to individual organizations we shall preserve their corporate titles. It is our hope to nationalize the term Tramway, which is now generally used in every English-speaking territory with the exception of the United States.

THE experiment we are making in keeping up a department devoted to the interests of street railroads is attended with mixed results, to moralize for just once, like about everything else one tries in this "working-day world." Letters received having reference to tramway matters speak appreciatively of that unique feature of the AMERICAN RAILROAD JOURNAL wherein they are treated; but, perhaps, a number approaching majority of the communications on the subject find fault with some little thing or other in the management of said feature. In short, our experience in the matter is one with the great majority of editors, first in the knowledge that it is impossible to edit a journal so as to please all readers; and, secondly, that persons in the community who think they can do the job much better than it is done, are quite respectably numerous. Nothwithstanding this fact, which is after all one to be thankful for rather than to grieve over, we cannot do otherwise than to persevere on the same general plan, which has hitherto proved successful. In its pursuance we have profited by the suggestions of correspondents as well as by the receipt of valuable information forwarded us by them; and write this paragraph chiefly for the purpose of assuring all people who have anything to say on the subject of street railroads, why we should be pleased to receive a letter from them, and that every communication received at this office is carefully considered, and dealt with in the manner which, after just and impartial consideration, seems to be right.

Street Railway Association—Convention of Representatives.

THE regular annual meeting of the American Street Railway Association will be held at the Grand Pacific Hotel in Chicago, Ill., the second Tuesday in October, (the 9th), 1883, at ten o'clock, A. M. Papers will be read and discussed on the following important subjects, viz.: "Construction of Track;" "Propelling Power;" "Buildings;" "Labor and Wages;" Collection of Fares;" "Removing Snow and Ice;" "Horseshoeing;" and "Heating and Lighting." The Association will be in session for at least two days, and the gathering of the representative street railway men of the United States and the Canadas is expected to be very large; with delegations also from Europe.

The Association has now a membership of thirty-nine companies, representing sixteen of the United States and the Dominion of Canada. The officers of the Association are: President, H. H. Little, general manager Louisville City Railway Co., Louisville, Ky.; Vice-Presidents, Wm. H. Hazzard, president Brooklyn City Railroad Co., Brooklyn, N. Y., C. A. Richards, president Metropolitan Railroad Co., Boston, Mass., Geo. B. Kerper, president The Mt. Adams and Eden Park Inc. Railway, Cincinnati, O.; Secretary and Treasurer, W. J. Richardson, secretary The Atlantic Avenue Railway Co., Brooklyn, N. Y. Executive Committee: President, Vice-Presidents and Julius S. Walsh, president Citizen's Railway Co., St. Louis, Mo., Chas. Clenshaw, vice-president Troy and Lansingburgh, Railroad Co., Troy, N. Y., Thomas Lowry, president Minneapolis Street Railway Co., Minneapolis, Minn., James C. Lake, superintendent Chicago West Division Railway, Chicago, Ill., D. F. Longstreet, general manager Union Railroad Co., Providence, R. I.

The AMERICAN RAILROAD JOURNAL will have its representatives at the Convention, and report in the October issue such details of proceedings as may be likely to interest readers of the "Tramway Department."

Motive Power on Tramways.—A Veteran's Opinion.

"My observations during fifty years, force me to the conclusion that the question as to the best methods of motive power on tramway roads is not settled against the use of horses; in fact, that the period of successful or profitable substitution of other motive power is further off than ever." The utterance quoted above was addressed to a JOURNAL representative by JOHN STEPHENSON, Esq., the veteran car-builder in this city, whose name as a pioneer in the street-car system, is everywhere known, and the productions of whose manufactory are in use in every civilized country. Mr. Stephenson is an acknowledged authority in his department, and his views will doubtless surprise many who are anticipating the epoch of electric force, "Keeley Motor" power, or some other substitute for the sure-footed horse. The various experiments in this city, upon the 4th, also 2d and 3d Avenues; in Brooklyn; Philadelphia; and elsewhere in this country and in Europe, were referred to in detail. Of all the tramway roads in existence, within city limits, Atlantic Avenue in Brooklyn is cited as the only one now using steam as a propulsive power directly attached to the cars.

The reason assigned for the failure is the simple fact that sufficient traction cannot be had upon the rail to overcome the difficulty so often arising from grades and curves, rains, or mud upon the surface. In the case of the 2d and 3d Avenues, the weight of the motors was much increased, and eight-wheeled cars were finally used, resulting however, in the destruction of track, in "spreading" of rails, etc., and experiments were abandoned, after 7 years of trial. Mr. S. humorously referred to a tramway road in a town in New Zealand, where, it was claimed, steam was successfully used instead of horses. An investigation developed that in this case the "T" rail was used upon ties laid upon the surface of the street—a method hardly to be tolerated in towns or cities usually.

The "Cable" system as operated in Chicago was favorably spoken of by Mr. Stephenson, as more likely to come into use. This, he admitted, had advantages, especially

upon lines where heavy grades exist; yet it is not at all demonstrated that even the cable system can be economically operated in any instance in comparison with horse power.

We hope in subsequent issues to have communications in our Tramway Department from the pen of Mr. Stephenson. In the meantime we invite expression upon the foregoing statements from those interested.

A "Cable" Road in New York.

A CABLE street-car road is to be constructed in this city. The route will be: 125th street, East River, West to 10th Avenue, through 10th Avenue to 180th street. The road will be double-track. Two cables in each track will be introduced, to provide against delays from breakage, etc., as often experienced elsewhere. D. J. Miller, Esq., is the engineer in charge of construction. Mr. Miller also superintended the construction of the cable roads in San Francisco and in Chicago. Our readers will doubtless recognize his name as that of a contributor to the columns of the AMERICAN RAILROAD JOURNAL.

The Cable Traction Question in England.

RECENT correspondence in *Engineering* contains a reply to a Mr. Conrad, in which the above matter is discussed. The writer, W. N. Colam, says: "In the first place, Mr. Conrad is evidently of the opinion that cable tramways are only suitable 'for such steep grades as locomotive engines cannot be worked with *advantage* on' or as he might have said, cannot be worked *at all* on; and I am surprised he did not gather from Mr. Findlay's paper (which he quotes) that the cable system was not introduced into Chicago for ascending steep grades, as that city is nearly a dead level, but that the tramway companies there adopted it to supersede horses solely on account of the wonderful engineering and financial success it had proved itself to be for some years previous, in San Francisco. I may also add that in Philadelphia, which is a particularly level city, the leading tramway companies have decided to convert their horse trams into the cable system, after first using horses, then steam engines, and then again horses; but not until they had thoroughly satisfied themselves of its suitability by constructing and running a test line. The same has also been done in many cities of the United States, including New York. Mr. Conrad is also sadly out with regard to what will be required to carry out the cable lines now in course of construction in England. In the first place he has been 'informed' that a five hundred horse-power engine costing two thousand pounds is to be used, instead of which, one of about forty horse-power nominal has been estimated for; he also tells us that 'cast-iron chairs of a *large* size and a very *expensive* pattern' have to be used, which I think may be most easily and quickly answered by saying that they *weigh* little more than some used on existing horse tramways for carrying the permanent way, and that they have been tendered for at the low figure of 4*l.* 9s. 6d. per ton. I will not enter into the subject of the relative merits of the Winterthur, the Wilkinson, or any other locomotive engine used for tramways, but I think most engineers will agree with me that haulage has been extensively and very economically used for pulling heavy trucks in the mining districts of this country for many years, and the cable tramway system is only the same thing, so constructed that it can be controlled to a nicety by the car-driver, and carry the public through the crowded streets of our cities with safety and comfort."

The Tramway in England.

HALF-YEARLY MEETINGS.

THE *Railway Times* of August 4, reports the half-yearly meeting of the North Metropolitan Tramways, held at the City Terminus Hotel, London, Mr. George Richardson presiding. The report stated that the gross receipts amounted to £143,779 and the total expenditure to £109,751, leaving as net profit £34,028. The sum available for dividend was £35,165. Out of this sum it was proposed to appropriate £34,650 to the payment of a dividend to the proprietors, at the rate of nine per cent. per annum, subject to deduction of income-tax. The balance £515 would be carried forward. The Chairman, in moving the adoption of the report, stated that a trial had been made of the use of thirty-one mules on a certain part of their system, and they had so far worked very satisfactorily. If they were found to be profitable to the company a larger number would be obtained. In reply to a shareholder, the Chairman stated that the falling off in the traffic receipts was due to some extent to the bad weather at the beginning of the year, and consequently many of their regular passengers traveled by railway. The report was adopted.

The same issue of the same journal contains an account of the half-yearly meeting of the Wolverhampton Tramways, held in London, and presided over by Mr. J. M. Gillies. In moving the adoption of the report, the Chairman said there had been a decrease in every item of the expenditure, except that incurred in the maintenance of the permanent way, and even that was a very slight one. The roads were in very good order, and the buildings and stables of the company were likewise in a state of thorough repair. Then as to the earning expense, there was naturally a decrease in the earnings, as they had been running less mileage. Mr. Foley inquired if the directors had any intention of introducing steam-traction, or whether they entertained the idea of using mules to draw the cars. The Chairman replied that they had already had some experience of steam, and while the system worked very well with them, yet they found it was more expensive. As to the employment of mules, judging from the experienee of the London companies, such, for instance, as the North Metropolitan, they could not do better than they were now doing. The report was then adopted.

A CHARTER was granted at Harrisburg, Pa., on the 22d ult., to the Philadelphia Traction Company, of Philadelphia, with a capital of $5,000,000. The directors are William H. Kemble, Peter A. Widener, William L. Elkins, George R. Yarrow, George W. Elkins, and George D. Widener. The directors own all the stock. The object of the company is the construction of cable motors and other appliances for a traction passenger railway, and the furnishing of the same.

On Bond with the Road-bed in Street Railroad Construction.

It is a general thing to treat of the road-bed in street railroad construction as of an ordinary foundation. In so doing, some points of radical difference are often overlooked. A foundation presents its area of greatest cohesion and stability at the bottom. Constructed purely for purposes of support, its nature is to become less massive as it ascends. Of a foundation it may be said that it depends upon increase of area as a support. Speaking of its mass, it may be said that it decreases as it ascends.

A road-bed presents very different conditions. It may be defined as "a foundation for a moving load." It consequently cannot depend upon increased area as a support, but rather upon distribution of area. Its greatest cohesion and mass are not below but above. In truth a road-bed may without exaggeration be considered a foundation turned downside up. It is a surface prepared for support and wear by a compact and durable crust. It is hence a result that piercing this crust brings us to softer material. It is a misfortune that the present street railroad construction pierces the compact part of the road-bed, and finds *its starting point in the softer substratum.*

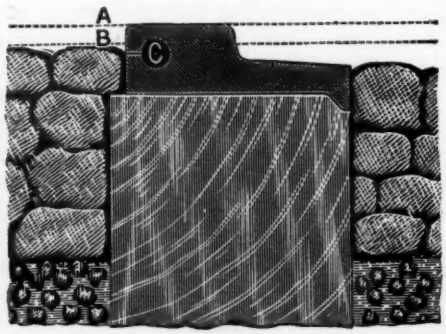
It is open to conjecture, even if it does not admit of absolute proof, that the cross ties in ordinary street railroad construction serve more to hold the track to gauge than to support it; and, contrary to the general impression, a large factor of support exists in the side friction of the system. It is further a rational deduction that the system would be more thoroughly supported if it were possible to float it in the compact crust of the road-bed, than it now is by the softer substratum. In the construction of a street railroad, no bond with the street is attempted. The railroad, while *in* the road-bed, is in no sense *part thereof.* There is with the present system no means of avoiding this disadvantage. So long as a flat and shallow rail is used, so long must timber be used as a stringer or stiffener. So long as timber is used must the system (owing to the depth thereof) pierce through the hard upper crust, and depend upon the softer soil beneath for its support. It is an engineering fact that natural bond is more to be depended upon in the cohesion of a structure than any artificial means of adhesion. By natural bond we mean the tendency of all particles to interlock and become mutually supporting. In concrete, the interlocking of the particles of the mass contributes as much to the strength thereof as the cement. In a structure, it is the bonding of the points rather than the adhesion of the mortar that gives stability. It is noteworthy that in nature, absolute adhesion is the exception rather than the rule. It is a further fact that where excessive stability is required, it is secured better by the natural bond of a number of particles (slight in itself but infinite in number) than by any means of artificial connection. An earth embankment, depending for its existence on its angle of stability only, is more efficacious against shot and shell than the most elaborate casemates or stone fortifications.

It does not appear impossible to depend upon the compact upper surface of the road-bed for support to the track, and to secure in a street railroad a perfect bond with the street. The average thickness of the metalling of a street or road-bed, may be taken as from 8 to 12 inches. We desire to float the rail in the compact upper crust. It must therefore be of less height than the depth of the metalling, say four and a half inches. This leaves a sufficiency beneath the same. We next want one rail anchored in or bonded with this crust, so that it is not free to move either way. To do this, we must present a cross section to each cardinal point. There is but one form available, viz., that of the girder. See illustration.

Here is a form that within the necessary dimensions gives ample stiffness, and enables us to dispense with the stringer. As compared with a 45-lb. tram-rail and a 5 x 9 stringer combined, it is three times as strong. It further presents an opposing surface to movement in any direction. Capable of perfect jointing, it is virtually continuous, and must be regarded as a system and not as a single rail. Hence it has an element of strength contributing to its stability which is absent in the tram system.

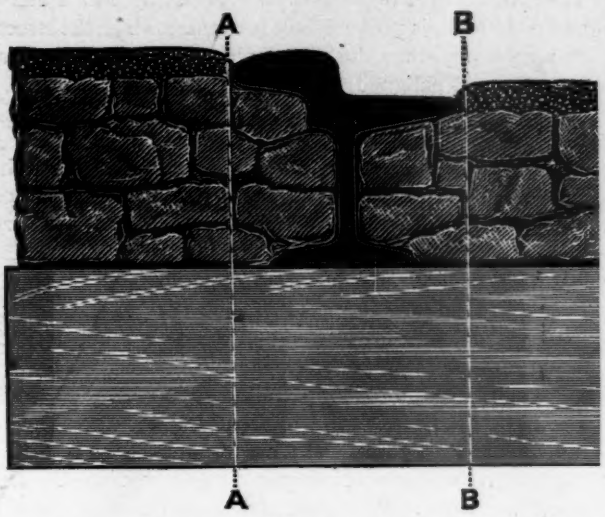
Any force applied to move or displace it, such as the impact of a heavy wagon, can only be applied at *one point.* This is met by resistance at *all points.* The part attacked cannot yield unless the whole system goes too. It is not possible to conceive of a force in practice that could achieve this. The impact of a six-horse loaded wagon would be as nothing compared to the resistance offered.

It is not, however, necessary to fall back upon the strength and stability of the system. Taking a given section of the rail as a unit, the result must be the same so long as the road-bed bonds with the rail. In paved streets this bond needs no discussion. In macadam or gravel, the bond is equally efficacious. In the tram system, the road-bed becomes quickly grooved adjoining the stringer. Referring to the drawing, it will be seen that it could not be otherwise.



As soon as the road-bed has settled down and worn, the head forms an obstruction to a passing wagon-wheel, see A B. The wheel slides or skids, and the rut is thus started. From this starting point it quickly deepens. The wheels wedge the street out from the stringers, as there is no bond

between the two. The only way the street can move is from the stringer.



In the form shown, this is not so. Noting the lines A A and B B, it is evident that instead of having a point of application from which to act in the destruction of the street, as in the case of the stringer, a wheel is as much supported here as in any other part of the street. In actual use this point has been demonstrated. The two systems laid side by side at the same time have exhibited the difference noted. After three years' use the road-bed is as perfect as when laid with the girder rail; with the tram, it is grooved adjoining the stringer. In English practice, the head of the rail is narrower than the general American practice. The girder rail has been long used there and found valuable; but owing to the difference of proportion noted, a thorough bond cannot be as well secured as in the same type of rail adapted to American practice; and thus, while retaining all the other advantages, one of the most important is lost. When put into dollars and cents, the point discussed is one that effects large and permanent savings in street railroad use, and is one that should not be ignored.

The Standard Index and Register.

THIS clever device, used and emphatically recommended, among many others, by the Central Park, North and East River Railroad Company, New York, the Norwich (Connecticut) Street Railroad, the Broadway and Seventh Avenue Railroad of this city; and the Metropolitan Railroad Company, of Boston, after careful comparison with other inventions of the kind, is manufactured by the Standard Index and Register Company, Nos. 138 and 140 Fulton Street, New York City. We spare a few lines of space to the statement of some of its peculiarities and advantages.

The Standard Index and Register is a fixture in the car, and becomes a part of the car. It cannot be tampered with, and it is impossible to use imitation instruments. The permanent or continuous register is put upon a paper dial, mechanically, by the conductor, and removed from the instrument when the day's work is completed, and compared with the amounts of money turned in during the day by him. Therefore a complete record of each day's work is obtained from the conductor himself, which cannot be obliterated. This principle of registering is entirely new, and positively stops any collusion between your employés. When a fare is collected by the conductor and he sounds the alarm, he has made a registration that cannot be changed or obliterated, even if it passes through a dozen or more hands. This being a fact, it must necessarily turn in more money than any other system of registering.

The use of trustworthy fare-registers is one of the most important subjects for a railroad company to consider; which observation gives great value to the announcement that the manufacturers of the Standard Index and Register offer a proposition to street car companies, to place upon their cars, free of charge, one or more of their instruments for trial.

Further particulars are supplied by the manufacturers when applied for by call or letter.

List of Recent Patents for Inventions Relating to Tramways.

BEARING DATE AUGUST 7, 1883.

282,564. MOTOR: Townsend Poore, Scranton, Pa. Filed March 5, 1883.
282,609. REIN-HOLDER: Edwd. E. Brewster, Holly, Mich. Filed April 3, 1883.
282,721. HORSE-COLLAR: Francis A. Hake, Cuero, Texas. Filed Nov. 4, 1882.
282,783. CONDUIT FOR TRACTION-ROPE RAILWAYS: Edward Samuel, Philadelphia, Pa. Filed April 27, 1883.

BEARING DATE AUGUST 14, 1883.

283,058. SUPPORTING CABLE USED IN PROPELLING CARS: Marks Arnheim, New York, N. Y. Filed April 23, 1883.
283,132. HORSESHOE: John J. Mervesp, New York, N. Y. Filed Mar. 14, 1879.
283,259. TRACE-BUCKLE: Emmit G. Latta, Friendship, N. Y., assignor of two-thirds to Adrian C. Latta, same place, and Harvey D. Blakeslee, Buffalo, N. Y. Filed May 3, 1883.
283,298. CAR-WHEEL GUARD: John Stephenson, New York, N. Y. Filed Feb. 23, 1883. Patented in England June 15, 1877.

BEARING DATE AUGUST 21, 1883.

283,385. MEANS FOR SHARPENING HORSESHOE-CALKS: Chas. F. Elmes, Chicago, Ill. Filed Feb. 23, 1883.
283,417. BREECHING-STAY FOR HARNESS: Robert P. Pearson, Philadelphia, Pa., assignor to Clanmar P. Hoskins, same place. Filed Sept. 12, 1882. Renewed July 17, 1883.
283,434. HORSESHOE: Frederick W. Steiner, Plainfield, Ill., assignor of one-half to Charles A. Steiner, same place. Filed June 21, 1883.
283,539. HALTER: Chas. S. Upton, Spencerport, N. Y. Filed June 15, 1883.
283,610. HORSE-COLLAR PAD: Joseph Kallista, Peoria, Ill., assignor of one-half to William C. Hanna, same place. Filed June 20, 1883.
283,693. SIDE AND CENTER LAMP AND REFLECTOR FOR STREET-CARS: Emile Boesch, San Francisco, Cal. Filed Aug. 18, 1882.
283,706. FARE-REGISTER: Jas. Goodfellow, New York, N. Y., assignor to John E. Mulford, same place. Filed June 11, 1883.
283,717. HORSE-COLLAR: Chas. Marin, St. Louis, Mo., assignor of one-half to Geo. J. Dailey, same place. Filed June 5, 1883.

BEARING DATE AUGUST 28, 1883.

283,849. HORSESHOE: John D. Billings, New York, N. Y., assignor of one-half to Charles White, same place. Filed March 12, 1883.
283,990. KNEE-BOOT FOR HORSES: Joseph Fennell, Cynthiana, Ky. Filed July 11, 1881.
284,020. TRACTION-CABLE RAILWAY: Orlando H. Jadwin, New York, N. Y. Filed March 31, 1883.
284,032. STREET-CAR BELL: John T. Marett, Philadelphia, Pa., assignor to Halstead & Spencer, same place. Filed May 28, 1883.

NOVEL ROLLING STOCK FOR TRAMWAYS.—The Australian government, which controls and operates all the railways in the colony, some time ago sent Mr. George Downe, superintendent of motive power of tramways, to this country to secure the construction of a combined locomotive and passenger car for use in the streets of Sydney. The construction of the car was intrusted to J. C. Brill & Co., and of the engine to the Baldwin Locomotive Works. The result of the united work of the two establishments was shown recently on Pennsylvania avenue, and in a trial trip up the Philadelphia and Reading Railroad for a distance of twenty-six miles and return, during which everything worked in a satisfactory manner, and a speed of fifteen miles an hour was made. The car has somewhat the appearance of a Frankford dummy, though much larger and more massive. The length of the car and engine is thirty-eight feet, and their combined weight fourteen and a half tons. The interior of the car is divided into four compartments, the seats in each facing, similar to those in a summer street car. Each seat accommodates six persons, making room for forty-six in all. There are also seats on top of the car, forty-two more being accommodated there. The streets through which this car is to run are quite narrow, and the tracks are laid on each side next the curb. The cars are inclosed, ingress and egress to each compartment being had through sliding doors on one side, the opposite side not being accessible for passengers. The car is finished inside and outside in sycamore and ash in their natural colors, presenting a bright, cheerful appearance. There is a platform at the rear end similar to common street cars, and from it a stairway leads to the roof. There is also a stairway in the same direction between the front end of the car and the engine. The engine is of the compound type, and in its construction are incorporated several special ideas of Mr. Downe, which it is expected will operate advantageously in their different points and connections. As the grades of the streets in Sydney are very heavy—that on the roads upon which this car is to run being one in nineteen—the engine is provided with a vacuum brake. It requires but one man to operate the machinery, which is placed at the sides of the car, and inclosed in strong sheet-iron boxes to preserve it from dust, etc. The engine has a capacity of twenty-five miles an hour, while the regulation speed in Sydney is ten miles.—*Railway World.*

THE "bob-tail" cars, which, with all their advantages, are not generally liked by the people, have received the condemnation of a New York jury, which, possibly, is no argument against their employment, in the judgment of those who prefer them. The facts of the inquiry were that a child aged one year and a quarter was run over and killed on the tenth ult. by a car of the Ninth Avenue Car Company, the driver, it was alleged, not having seen the child, as he was making change at the time. At the inquest, the jury, after returning a verdict in accordance with the facts, recommended the employment of conductors on all street-car lines in the city, and censured the Ninth Avenue Company for not employing any. The coroner refused to accept the verdict at first, insisting that the jury intended only to make a recommendation, and not to censure the company. The jurors, however, declared that they meant all they had said, and the verdict was therefore recorded. We wonder what the verdict of the jury would have been had there been a conductor on board the car. The running over of persons by cars having both a driver and conductor, is probably not less unknown in the streets of a great city, than the said deplorable event in the case of the much-maligned "bob-tail."

THE BRIDGE CARS.—The delay in running cars on the New York and Brooklyn Bridge provoked the publication of a letter published in the New York *Times*, on the 22d ult. Its writer, "A. B. M.," inquires: "Has Col. Paine lost his grip? If not, why are the cars not running on the Brooklyn Bridge? It appears to me that a great deal of public money is being wasted and the dear public are suffering for want of proper conveyance over the great bridge, to say nothing of the poor patrolmen being bored to death answering questions as to why the thing don't go; and all this for the reason that Col. Paine wants the glory of being the inventor of a new improved grip to carry his cars along the cable. Why lose time experimenting when a perfect system can be had? The California system has been a complete success, both in San Francisco and in Chicago, and had it been used the cars would have been running on the bridge a month ago, and enough money saved to have paid for the California patent. How much more time is to be wasted in experiments? Another great mistake, I think, has been made in having such large and heavy cars for so short a route. A smaller and lighter car would have been much easier handled every way, and particularly in switching at each end of the bridge."

THE *Deutsche Bauzeitung* published an article recently concerning a contract for an electric street railway, which was awarded to Siemens & Halske, under the management of Engineer Swieger, formerly of the City railroad of Berlin. The first designs for an electric railway in Vienna were originated by Berthold Mendel, who, in 1881, talked on the subject to the Vienna authorities, and also in 1882 in Berlin. That he understands the subject thoroughly will be seen from the fact that a diploma was awarded him in Munich, at the Electrical Exposition, for his lectures upon the matter. The material for the construction is now at Königsberg. The firm of Siemens & Halske, although familiar with this work, gave the construction to Berthold Mendel.

ATTENTION is called to the advertisement of Messrs. Lewis & Fowler, elsewhere in the JOURNAL. They advertise an improved "Alarm Register Punch" which received the First Prize Medal at the Exposition in Chicago, and is in use on many of the Brooklyn City railroads and elsewhere.

THERE are at present 5,722 street cars running daily in the city of Boston, and 22,703 men employed by the same corporations. The Metropolitan Railroad Company has 75 miles of track, 31 patent switches and 29 hand switches; the South Boston Railroad 9 patent and 19 hand switches; the Middlesex, 19 patent and 16 hand switches; the Union, 12 patent and 19 hand switches; the Charles River, 3 patent and 5 hand switches.

Registers and Register Punches.

VALUABLE AUXILIARIES FOR TRAMWAY COMPANIES—A NEW DEVICE FOR EXTRA BAGGAGE ON STEAM ROUTES—APPLIANCES INTRODUCED BY MESSRS. BEADLE & COURTNEY, 1193 BROADWAY, NEW YORK.

VISITORS at the "National Exposition of Railway Appliances" in Chicago, were much attracted to the handsome booth of Messrs. Beadle & Courtney, general agents of the Railway Register Manufacturing Company, of Buffalo, in which were exhibited their ingenious devices for registering fares collected on horse-cars, and thus insuring *full returns from conductors*, a result never reached under the old systems, where no checks were put upon the peculations of dishonest employés. The importance of the object sought may be better understood when it is known that this company alone owns over 100 patents. The rather comprehensive reference to the scope of the

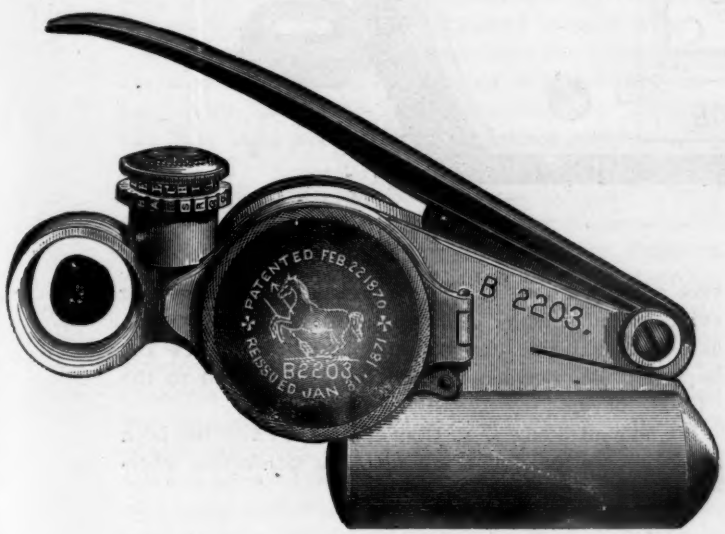


FIG. 1.

company's operations, which we quote herewith, will suggest the variety of interests represented: "Owners and Manufacturers of the latest Designs, Improvements and Inventions in Registers, Indicators, Classifiers, and Punches, for the Recording of fares collected on Street and Steam Railroads."

In order to introduce more fully this important interest to those operating tramway roads especially, we will subjoin a few illustrated descriptions from the catalogue of Messrs. Beadle & Courtney. Fig. 1 illustrates a device which is well received, and has had large sales. It is called

THE ALARM REGISTERING PUNCH.

This register is in general use throughout the United States and Europe. It is claimed to be the most perfect check that has ever been placed before the public for the collection, registration and classification of fares on street railroads, especially where different rates of fare and tickets are collected. The duties required of the conductor in the use of the Bell Punch are such that failure to comply will—and cannot fail to—attract the attention of passengers, and those interested in the road. An additional feature of this Register is the receptacle for retaining the clippings, thereby giving an audit of the conductor's account, proving the correctness or otherwise of his returns for all fare collected. Fig. 2 has certain advantages which are detailed herewith, and it is called

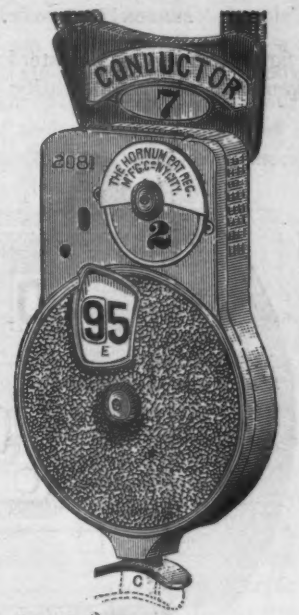


FIG. 2.

THE "HORNUM" REGISTER.

It is light in construction, and is acknowledged to be a valuable and reliable machine. It has the Direction Plate attachment, showing the direction in which the car is

FIG. 3.

going, insuring the turning back of the trip register to zero at each end of the road. Among the improvements is the positive movement in the main Register, increasing the weight of the machine less than one-half ounce, and the *strength* over three hundred per cent. For a road with one or two rates of fare, it is particularly recommended.

Fig. 3 is a device but recently introduced, is very perfectly adapted for the use intended, and has been adopted upon several of the largest tramway roads. It is called

THE "BENTON" REGISTER.

It shows a figure on front of Register for every cash fare or ticket taken, has also an indication plate which the conductor is obliged to turn at the end of the route, showing which way he is going, which insures the turning back to zero of the trip dial at the end of each half trip. On the back side is the permanent Register, which records 1,000,000. It is also provided with a punch at top, to cancel passes or tickets.

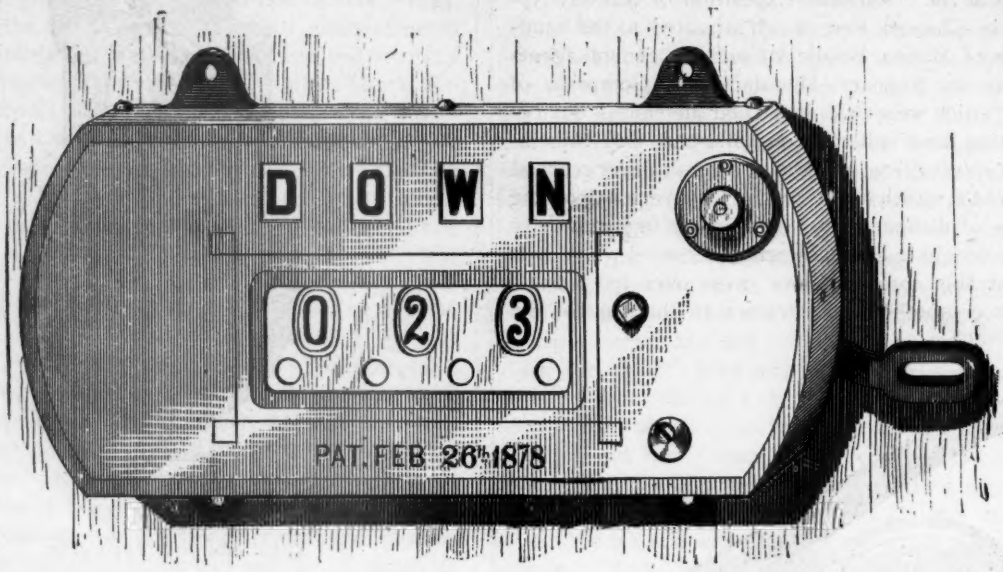


FIG. 4.

The next device introduced (Fig. 4) is unlike the preceding, in that it is not carried by the conductor, but is attached to the car itself. It is simple in construction, is not liable to get out of order, and is largely in use. It is called

THE "POND" REGISTER.

Messrs. Beadle & Courtney speak of this device as follows: "Our Pond Stationary Register is especially adapted for use on large and small cars. The Indication Plate will show the direction the car is traveling, and at the end of each trip the direction or indicating plate must be shifted so as to denote the direction of the next trip or half trip. This is done by turning a thumb-pin at the right hand upper corner of the machine, but before this can be done, the trip or visible Register must be first set back to zero. This Register is put up with rod connections operated by a wrench from any part of the car, and is absolutely under the control of the conductors on large cars and drivers on small cars, preventing passengers or evil-disposed persons from ringing or tampering with it, as is done with Registers operated by a strap." New and important improvements have been lately added to the "Pond" device.

We now introduce (Fig. 5) an appliance which has been thoroughly tested, and is giving great satisfaction wherever used. It is called

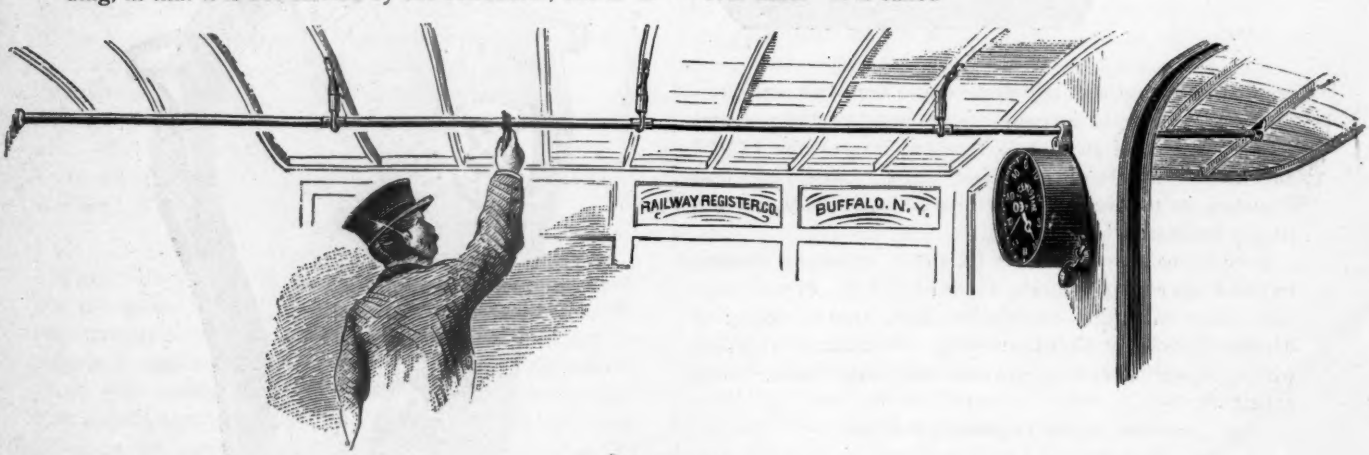


FIG. 5.

THE "MONITOR" REGISTER.

We will again quote from the manufacturers' description, as being so explicit and full that it needs no further statement from us to explain its workings:

"The Monitor register is of the 'Duplex' kind, and resembles a clock in appearance; the dial is divided into one hundred divisions and numbered prominently; a long hand or pointer moves over this dial, and records the fares taken on each trip. A smaller hand, in connection with a

hundredth disk, records the totals, and constitutes what is known as the 'Permanent Register,' or Register of Totals. The Trip Register is set back to zero at the end of each trip by a key.

"This machine is a very strong, durable Register, and when there is but one or two rates of fare only to be recorded, it is one of the best Registers of its kind. The conductor can record the fares on the platform as well as in the car.

"This machine has a large bell, which can be distinctly heard from any part of the car.

"The cut herewith shows the position of the MONITOR in the car, and the conductor about to record the fare he has just collected.

"The rod connection used with this Register can be applied to the POND REGISTER. We also have a rod attachment to be used in connection with our Registers for double-ender cars, where the fare-box is used, and so arranged that the driver records the fares deposited in the box. This rod connection is constructed so that when one end is used the other end is locked automatically."

A new and improved "Monitor" has lately been introduced by Messrs. Beadle & Courtney, in which the "up" and "down" attachment is a particular feature. This device they state is owned and controlled exclusively by them.

The "Railway Register Manufacturing Company" make all kinds of connections, to be used with machines suitable for one-horse cars, omnibuses, etc. All their Registers are fully covered by letters patent in this and foreign countries. It is claimed for the company that their products are made with a view to *durability* and *strength* in construction. As the company supply the devices on royalty, and warrant to keep all in perfect repair at their own expense, it will be seen that from an economic point of view this policy is wise; and the users of their Registers will be saved the annoyance occasioned by the failures of inferior appliances. Were our space not limited, we would give a list of the tramway roads using the Registers and Punches introduced by Messrs. Beadle & Courtney. The list, however, may be found in the finely illustrated catalogue published by the firm, which will be furnished upon application to these gentlemen, by mail or otherwise, at their address, 1193 Broadway, New York City, or 426 Walnut-st., Phila., Pa. After a careful inquiry into the merits of the various devices, we can advise that a most thorough test of those to which we have referred, will give satisfaction.

Before closing this article, we wish to add that the company are experimenting now with some new devices, which are to be adapted for use also upon Steam Railroads. From the promises of Messrs. Beadle & Courtney in this connection, we may safely advise that the advantages involved will be very great. Correspondence with them will doubtless elicit valuable information.

Our attention was called to a new device for the "Baggage" departments of Railroads. It is designated an "Extra Baggage Receipt." It has for four years been in constant use in the Union Depot in St. Louis, and indorsed by the General Agent, W. M. Steele, as an invaluable adjunct to his department. He says that since it was adopted, it has been a perfect safeguard to the traveler against the extortion practiced by employés upon travelers having extra weight of baggage, and has also insured to the companies using it at St. Louis, their just charges. We desire to call the attention of all those in responsible connection with Baggage Departments upon steamers and railroads, to this "Extra Baggage Receipt" introduced by Messrs. Beadle & Courtney, as an invaluable aid to them. It will indicate from the fractional part of a dollar to any amount, and is so simple that it can be easily understood. Awards were made to Messrs. Beadle & Courtney both for the excellence of their exhibit as such, and for the superiority of their products, at the Exposition in Chicago.

TRAMWAY NOTES.

AN electric tram-car, invented by Mr. Holroyd Smith, of Halifax, N. S., is being run in that town with satisfactory results.

CONDUCTOR (declining a temperance tract which a lady handed him with her fare), "much obliged, but we ain't allowed to take any perquisites whatever, mum."

ABOUT 3,000 persons attended the concert in Prospect Park, Brooklyn, Aug. 18. A feature of the music was a street railroad galop in which the conductor's whistle was sounded. A copy of the music was given to every woman passenger on one line of cars running to the Park.

THE Johnstown Steel Street Rail Company have commenced the manufacture of the rails at the Cambria Iron Works. The rail has the ordinary L face used on the street railways, but the body and bottom are made like the T rail. This form obviates the use of wooden stringers, as the rails can be spiked directly to the cross ties and connected by splice bars, making a continuous rail. They are made of Bessemer steel.

THE Supreme Court of Michigan holds that in cases of injury on railways there is no presumption of negligence on the part of the company. Passengers must take the responsibility of informing themselves of the every-day incidents of railway traveling.

SAN FRANCISCO has eight lines of cable road completed, or nearly so. The total length is fifty miles. Chicago comes next with twenty-two miles. The average cost is stated to be about $120,000 per mile.

AN OMNIBUS PROPELLED BY ELECTRICITY.—Some very interesting experiments were made to-day at the Place de la Concorde with one of the Omnibus Company's large three-horse vehicles. It was driven by electricity at a rate superior to that at which omnibuses generally go, and was turned with surprising facility. At 5 o'clock, M. Cochery, Minister of Posts and Telegraphs, M. de Lesseps, MM. Dietz, Rouvier, Blanchard, Burgues, Col. Barolez and several gentlemen got into the omnibus, which, to the astonishment of a large crowd, was seen to move off rapidly without horses. The mechanism by which it was propelled was simple. Four accumulators, weighing 2,500 kilogrammes, and giving out a force of 72-horse-power, had been placed under the seats and put in communication with a Siemens machine fixed under the vehicle.—Paris letter in *London Standard*.

THE Phœnixville Iron Works have received a contract from the Union Passenger Railway Company, of Philadelphia, to build the iron frame-work for eight miles of cable road.

New Inventions.

TO INVENTORS.

THIS department of the JOURNAL is devoted to descriptions of new inventions applicable to railroads. We publish each month a list of the same, and invite each inventor to forward us a description of his invention, believing the publication of facts regarding them will be perused with interest by railroad men, and all interested in the development of our railroad system. *We make no charge for publishing these.*

The descriptions of an invention should be carefully prepared, and written only on one side of the sheet, each sheet properly numbered. Cuts (electrotypes) illustrating the device are always an aid, and attractive to the reader. These should be procured and sent with the "copy." They can be sent by mail. The position of the cut or cuts should be noted in the "copy."

List of Patents for Inventions Relating to Railways, Machinery, Etc.

BEARING DATE AUGUST 7, 1883.

282,480. SPEED-GOVERNOR FOR STEAM-ENGINES: David E. Adams, Pittsburgh, Pa., Administrator of James D. Willoughby, deceased. Filed May 10, 1883.

282,484. SPARK-CONDUCTOR FOR LOCOMOTIVES: Chester C. Baum, Dover, Del. Filed May 29, 1883.

282,487. SPEED-INDICATOR: Thos. Blanchard, Stoughton, Mass. Filed March 29, 1883.

282,503. DIRECT-ACTING ENGINE: Isaac B. Davis, Hartford, Conn. Filed April 27, 1883.

282,505. ROTARY ENGINE: Dana Dudley, Boston, Mass., assignor to David S. G. Doane, Cohasset, Mass., and D. A. Plecker, Mount Crawford, Va. Filed Jan. 2, 1883.

282,507. CAR-AXLE: William S. Eberman, Sandy Lake, Pa. Filed May 19, 1883.

282,510. CAR-TRUCK: Leonard Finlay, Little Rock, Ark. Filed May 12, 1883.

282,519. MECHANICAL STOKER: George E. Hibbard, Evanston, Ill., assignor of one-half to Nelson C. Gridley, same place. Filed April 20, 1883.

282,520. ROTARY ENGINE: George E. Hibbard, Evanston. Ill., assignor of one-half to Nelson C. Gridley, same place. Filed March 16, 1883.

282,528. VELOCIPEDE: Thos. B. Jeffrey, Chicago, Ill. Filed May 31, 1882.

282,569. CAR-SIGNAL: Wm. H. Rushforth, Camden, N. J. Filed Oct. 4, 1882.

282,593. CAR-WHEEL: Jas. M. Whiting, Providence, R. I., assignor of one-half to Julius Carroll and George C. Eliott, same place. Filed May 14, 1883.

282,594. LUBRICATOR FOR CAR-JOURNALS: S. Lloyd Wiegand, Philadelphia, Pa. Filed Dec. 8, 1882.

282,598. CAR-DOOR FASTENER: Arnold W. Zimmerman, Chicago, Ill. Filed April 9, 1883.

282,616. CAR-COUPLING: Frank L. Eager, Palmer, Mass. Filed Jan. 30, 1883.

282,623. REFLECTING-MIRROR ATTACHMENT FOR LOCOMOTIVES: Daniel Frost and Henry Cartwright, Portland, Oregon. Filed May 5, 1883.

282,631. RAILROAD-GATE: George A. Hall, South Waterford, Me. Filed April 20, 1883.

282,672. CAR-BRAKE: John G. Schiller, Youngstown, Ohio, assignor of one-half to Joseph Whitman Smith, same place. Filed April 27, 1883.

282,701. GRADING AND LEVELING MACHINE: Jas. M. Buckley, Portland, Oregon. Filed Jan. 15, 1883.

282,706. STOCK-CAR: Isaac H. Dahlman and Charles Dahlman, New York, N. Y. Filed June 4, 1883.

282,714. CAR-BRAKE: Humphrey M. Glines, East Boston, Mass. Filed June 1, 1883.

282,730. AUTOMATIC RAILROAD SIGNAL AND ALARM: Henry G. Jones, Darby, Pa. Filed July 19, 1882.

282,732. CAR-COUPLING: Squire Richard Jones, Lacon, Ill. Filed May 25, 1883.

282,734. CAR-COUPLING: Eli Kirk, Clarksville, Ohio. Filed May 25, 1883.

282,739. RAILROAD-RAIL AND RAIL-JOINT: Peter A. Locke, Silver Cliff, Col. Filed April 3, 1883.

282,748. CAR-BRAKE: Jacob D. Miller, York, assignor to himself, and Jacob Broadbeck, Jeffersonborough, Pa. Filed Nov. 25, 1882.

282,751. COAL-CAR: Jas. A. Millholland, Cumberland, Md. Filed April 16, 1883.

282,753. REVERSING-GEAR FOR ENGINES: Joseph V. Moore, Des Moines, Iowa, assignor of one-half to H. C. Ensminger, same place. Filed April 19, 1883.

282,773. UTILIZING EXHAUST-STEAM: David Renshaw, Braintree, Mass. Filed Jan. 6, 1883.

282,776. AUTOMATIC ALARM DEVICE FOR RAILROAD-CROSSINGS: Elias E. Ries, Brooklyn, N. Y. Filed Aug. 31, 1882.

282,789. GOVERNOR FOR STEAM-ENGINES: Jesse M. Smith, Detroit, Mich. Filed May 11, 1883.

282,796. CAR-AXLE BOX: Oscar S. Stearns, New York, N. Y., assignor of one-half to Amos Rogers, same place. Filed Dec. 2, 1881. Renewed May 29, 1883.

282,804. FEED-WATER HEATER AND PURIFIER: William P. Thompson, Philadelphia, Pa. Filed March 12, 1883.

282,808. STEAM-GENERATOR: James R. Vance and Stephen D. Parker, Geneva, N. Y. Filed March 8, 1883.

282,815. TRANSFERRING CARS FROM ONE TRACK TO ANOTHER: William Wharton, Jr., Philadelphia, Pa. Filed May 10, 1883.

282,825. CAR-WHEEL CHILL: William Wilmington, Toledo, Ohio. Filed Jan. 21, 1881.

282,827. RAILROAD-CAR: Thomas L. Wilson, Port Hope, assignor of one-half to Eugene Harmon Davis, Toronto, Ontario, Canada. Filed Jan. 22, 1883.

282,828. DEVICE FOR REMOVING PISTON-RODS FROM CROSS-HEADS: James E. Worswick, Montgomery, Ala. Filed May 17, 1883.

282,845. STEAM-BOILER FURNACE: Edward Clark, New York, N. Y. Filed May 25, 1883.

282,871. CAR-AXLE BOX: John G. Ernst, Baltimore, Md., assignor of one-half to Jeremiah D. Mallory, same place. Filed March 1, 1883.

282,887. BAGGAGE-RACK FOR RAILWAY-CARS: Henry C. Hart, Detroit, Mich. Filed June 12, 1883.

282,889. CAR-VENTILATOR: Samuel C. Hill, Samuel D. Webb, and Risdon M. Odell, Washington, D. C. Filed July 7, 1883.

282,894. VALVE: Timothy Holland, Troy, N. Y. Filed Oct. 17, 1882. Renewed July 9, 1883.

282,896. CAR-COUPLING: Reuben R. Hunt, Lexington, Ky. Filed Jan. 3, 1883.

282,902. FEED-WATER HEATER: John Keller, St. Louis, Mo. Filed April 9, 1883.

282,906. BALANCED SLIDE-VALVE: John Charles Knecht, Sigel, Ill. Filed March 23, 1883.

282,907. ROTARY STEAM-ENGINE: John Andrew Knight, Marlborough, N. H., assignor to himself and Richardson H. Montgomery, West Plains, Mo. Filed Jan. 16, 1883.

282,908. GOVERNOR FOR STEAM-ENGINES: William Knowles, Bolton, County of Lancaster, England. Filed July 10, 1883. Patented in England Jan. 21, 1882, No. 310.

282,910. CAR-COUPLING: Jas. Learmonth, Corsicana, Texas. Filed Jan. 15, 1883.

282,931. SCALE FOR STEAM-ENGINE INDICATORS: James W. See, Hamilton, Ohio, assignor to the Ashcroft Manufacturing Company, of Massachusetts and New York. Filed Dec. 18, 1882.

282,932. REVERSING-GEAR FOR ENGINES: Freedom G. Shepard Andrew J. Hoag, and Andrew Thomson, Battle Creek, Mich., assignors to Nichols, Shepard & Company, same place. Filed Feb. 5, 1883.

282,933. SPARK-ARRESTER: Nicholas Shoptaugh, Booneville, Ind. Filed June 30, 1881. Renewed April 18, 1883.

BEARING DATE AUGUST 14, 1883.

283,011. SNOW-PLOW: Lyman Morgan, Port Washington, Wis. Filed Dec. 9, 1881.

283,017. LUBRICATOR: Charles H. Parshall, Jr., Detroit, Mich. Filed Jan. 4, 1883.

283,028. LOCOMOTIVE-BRAKE: Charles J. Schiller, St. Louis, Mo., assignor to the American Brake Company, same place. Filed May 10, 1883.

283,046. REVERSING-VALVE FOR STEAM-ENGINES: Charles H. Upton, Minneapolis, Minn. Filed March 5, 1883.

283,063. MOTIVE POWER: Harry Blake, Chicago, Ill., assignor to himself and C. E. Blake, same place. Filed Feb. 5, 1883.

283,064. STEAM-PUMP: James H. Blessing, Albany, N. Y. Filed Mar. 11, 1882.

283,076. RAILROAD-TIE AND FASTENING: Joseph L. Chapman, Philadelphia, Pa. Filed Sept. 26, 1882.

283,078. CAR-SPRING: Edward Cliff, Oswego, N. Y., assignor to Cliff & Righter Company, (Limited,) same place. Filed March 24, 1883.

283,146. SAFETY-VALVE: George W. Richardson, Boston, Mass., assignor to the Consolidated Safety-Valve Company, Hartford, Conn. Filed May 2, 1883.

283,150. REFRIGERATOR-CAR: Levi Rutter, Newmanstown, Pa. Filed March 3, 1883.

283,151. CAR-DOOR TRACK: William Scarffe, Brooklyn, N. Y. Filed June 1, 1883.

283,152. ELECTRIC-CIRCUIT TRACK-INSTRUMENT: Charles A. Scott, Boston, Mass. Filed April 26, 1883.

283,174. PHOTOGRAPHIC PASSENGER-RECORDER: Charles W. Weiss, Brooklyn, assignor of one-half to Charles Kruse, New York, N. Y. Filed Aug. 30, 1882.

283,176. LUBRICATOR FOR ENGINE-CYLINDERS: Jonas A. Wheeler, Vandalia, Mo. Filed April 27, 1883.

283,216. BALANCED SLIDE-VALVE: William M. Deal, Philadelphia, Pa., assignor to himself, James W. Courtney, and Robert F. Frankenfield, same place. Filed Nov. 6, 1882.

283,218. ADJUSTABLE ELEVATOR-PLATFORM FOR VESSELS FOR CARRYING RAILWAY-CARS: J. Joseph De Rycke, New York, N. Y. Filed Jan. 18, 1883.

3,219. CAR-BRAKE AND STARTER: Arthur S. Dickinson, Springfield, Mass. Filed July 2, 1883.

283,226. STEAM-ACTUATED VALVE: George E. Elliott, Calais, Me., assignor of one-half to Edward J. Crangle, same place. Filed April 20, 1883.

283,230. RAILROAD CROSS-TIE: Henry F. Flickinger, Bucyrus, Ohio. Filed April 21, 1883.

283,231. ELECTRIC LOCKING MECHANISM FOR SWITCH AND SIGNAL LEVERS: Oscar Gassett, Boston, Mass. Filed April 4, 1883.

283,232. RAILWAY SIGNAL LOCKING APPARATUS: Oscar Gassett, Boston, Mass. Filed July 19, 1882.

283,254. LOCOMOTIVE HEAD-LIGHT: J. Miller Kelly, Rochester, N. Y. Filed June 18, 1883.

283,261. DIRECT-ACTING COMPOUND ENGINE: Erasmus Darwin Leavitt, Jr., Cambridge, Mass., assignor to Dauphin S. Hines, William A. Perry, and Charles C. Worthington, New York, N. Y. Filed June 27, 1883.

283,275. NUT-LOCKING DEVICE: James S. Peironnet, Wheaton, Ill. Filed June 14, 1883.

283,281. RAILROAD-SIGNAL: Caleb M. Risley, Woodbury, N. J., assignor of one-half to Joseph A. Green, same place. Filed Feb. 24, 1882.

283,311. CASTING CAR-WHEELS: William Wilmington, Toledo, Ohio. Filed July 10, 1883.

283,338. ATTACHMENT FOR BOILER-FURNACES: Geo. S. Gilbert, Baltimore, Md., assignor of one-third to Thomas M. Broderick, same place. Filed Jan. 15, 1883.

283,340. FREIGHT-CAR: Nathan Hanson Greene, Montreal, Quebec, Canada. Filed Feb. 19, 1883.

283,359. STEAM-ACTUATED VALVE: John W. Russell, South Hadley Falls, assignor to the Valley Machine Company, East Hampton, Mass. Filed Feb. 28, 1883.

283,361. LUBRICATOR: Richard Stevens and William Imrie Mann, Braddock, Pa. Filed Dec. 6, 1882.

BEARING DATE AUGUST 21, 1883.

283,367. CHILLED-CAR-WHEEL BORING AND TRUING MACHINE: William P. Barclay, Chicago, Ill. Filed July 12, 1882.

283,368. FLUID-PRESSURE CAR-BRAKE: Henry Barratt, York, Pa., assignor of one-third to Jacob O. Miller, same place. Filed Feb. 5, 1883.

283,399. LUBRICATOR: Friderich Jarecki, Erie, Pa. Filed Oct. 27, 1882.

283,438. BRAKE-SHOE: Alexander B. Todd, Philadelphia, Pa. Filed June 6, 1883.

283,441. STOCK-CAR: John K. Weber, Titusville, Pa. Filed May 4, 1883.

283,446. CAR-BRAKE: William A. Wilde, Chicago, Ill. Filed May 25, 1883

283,479. VALVE: Thaddeus Galvin and John Galvin, Detroit, Mich. Filed May 21, 1883.

283,481. LUBRICATOR: John Graham, Chicago, Ill. Filed May 21, 1883.

283,533. HEAD-REST FOR CAR-SEATS: William Bell Taylor, Waltham, Mass. Filed April 28, 1883.

283,534. COMPRESSED-AIR BRAKE: Albert Thayer and Martin Joseph Connelly, Roxbury, Mass. Filed July 7, 1883.

283,535. RAIL-STRAIGHTENING MACHINE: Cyrus P. Tittle, Johnstown, Pa. Filed March 3, 1883.

283,538. VALVE-GEAR FOR STEAM-ENGINES: William Bright Turman, Waldron, Ark. Filed Dec. 1, 1882.

283,566. CYLINDER-COCK: James N. Chamberlin, Marietta, Ohio. Filed May 31, 1883.

283,619. AUTOMATIC CAR-SCALE: Charles Lederer, Norfolk, Neb., assignor to Bernhard W. Jonas and Charles M. Selby, same place. Filed June 21, 1883.

283,631. CAR-WHEEL: Edward B. Meatyard and James White, Geneva, Wis. Filed Sept. 22, 1882.

283,632. RAILWAY-TRACK: John A. Merrill, Pottstown, Pa., assignor to E. & T. Fairbanks & Co., St. Johnsbury, Vt. Filed April 18, 1883.

283,633. SIGNAL-LANTERN: Christian E. Metzler and John H. Burrell, Jr., Philadelphia, Pa., assignors of one-third to James Calhoun, same place. Filed June 20, 1883.

283,656. AUTOMATIC CUT-OFF FOR ENGINES: Jno. B. Pitchford, San Francisco, Cal. Filed March 22, 1883.

283,691. LID FOR CAR-AXLE BOXES: Jackson R. Baker, Jersey City, N. J. Filed Jan. 11, 1883.

283,695. LUBRICATOR: Constant W. Booth, Brooklyn, N. Y. Filed May 11, 1883.

282,704. ENGINE: Robert M. Fryer, New York, N. Y. Filed Dec. 9, 1882.

283,708. BOILER-FURNACE: William P. Hall, Piqua, Ohio. Filed June 5, 1883.

283,711. PISTON-ROD PACKING: Henry C. Hunt, Newark, N. J. Filed Feb. 21, 1883.

283,721. AUTOMATIC SWITCH-CLOSER: Charles L. Northrup, Salem, Mass. Filed March 3, 1883.

BEARING DATE AUGUST 28, 1883.

283,743. CAR-COUPLING: Asher W. Avery, Verndale, Minn., assignor of one-half to Enoch L. Ingalls, same place. Filed Sept. 30, 1882.

283,749. RELIEF-VALVE FOR LOCOMOTIVE-ENGINES: Robert C. Blackall, Albany, N. Y. Filed July 5, 1882.

283,754. MEANS FOR STOPPING RAILROAD-TRAINS: John Chandler, Brooklyn, N. Y. Filed April 2, 1883.

283,759. ELECTRIC LOCOMOTIVE: Leo Daft, Greenville, N. J. Filed Sept. 6, 1882.

283,760. RAIL FOR ELECTRIC RAILWAYS: Leo Daft, Greenville, N. J. Filed March 27, 1883.

283,761. ELECTRIC LOCOMOTIVE: Leo Daft, Greenville, N. J. Filed June 14, 1883.

283,773. CUT-OFF VALVE: John Graham, Chicago, Ill. Filed Feb. 23, 1883.

283,784. CAR-REPLACER: Michael Herrens, St. Louis, Mo. Filed Sept. 22, 1882.

283,788. VALVE: John Johnson and Louis Wagner, Chicago, Ill., assignors of one-third to Gerald Allen, same place. Filed Sept. 18, 1882.

283,839. SPARK-CONDUCTOR FOR LOCOMOTIVES: Frederick B. Wells, Montreal, Quebec, Canada. Filed Dec. 12, 1882.

283,842. GOVERNOR: Edward Wright, Worcester, Mass., assignor to the Wright Machine Company, same place. Filed May 28, 1883.

283,845. CAR-COUPLING: Samuel B. Archer, Pittsburgh, Pa., assignor to the Archer Automatic Car-Coupler Company, Saratoga Springs, N. Y. Filed July 5, 1883.

283,860. LUBRICATOR: Samuel G. Cabell, Washington, D. C., assignor to Flora B. Cabell, same place. Filed March 26, 1883.

283,875. RAILWAY-SWITCH: James Evans, Oneonta, N. Y. Filed April 20, 1883.

283,920. CAR-COUPLING: Robert Powell, Kansas City, Mo. Filed Aug. 12, 1882.

283,931. LUBRICATOR: Allen W. Swift, Elmira, N. Y. Filed June 13, 1828.

283,947. RAILWAY AND CAR: Louis Augspath, Little Rock, Ark. Filed Oct. 9, 1882.

283,978. VALVE FOR STEAM-ENGINES: Riley Doty, Leonardsburg, Ohio. Filed Dec. 27, 1882.

283,991. CAR-COUPLING: William Livingston Fisher, Bay City, Mich. Filed Dec. 27, 1882.

284,010. DIRECT-ACTION STEAM-PUMP: John Henwood, Philadelphia, Pa., assignor to himself, Joseph C. Whitaker, and Charles R. Scull, all of same place. Filed March 9, 1883.

284,028. CAR-WHEEL: Jas. T. Leighton, New Haven, Conn. Filed Feb. 21, 1883.

284,035. GAUGE FOR CUTTING CAR-BRACES: Christopher Mattice, Delhi, N. Y. Filed May 9, 1883.

284,103. STOCK-CAR: Jas. Clark Weaver, Cutler, Ind., assignor to himself and John Felthoff, same place. Filed May 29, 1883.

284,108. CAR-COUPLING: Jessie W. White, Red River Iron Works, Ky. Filed June 11, 1883.

284,114. ELECTRIC SIGNAL FOR RAILWAY-STATIONS: Aaron D. Blodgett, Boston, Robert M. Read, Cambridge, and Jacob P. Tirrell, Boston, Mass. Filed Dec. 20, 1882.

284,116. STOCK-CAR: George D. Burton, New Ipswich, N. H. Filed May 31, 1883.

284,125. ROTARY STEAM-ENGINE: Walter Gibb, Pittsburgh, assignor to himself and A. C. Milliken, Millvale Borough, Pa. Filed March 23, 1883.

284,141. ROOF FOR RAILWAY-CARS: Will A. Murtfeldt, Cincinnati, Ohio. Filed Feb. 15, 1883.

284,144. RAILROAD-SWITCH STAND: Patrick O'Hern, Chapman, Neb. Filed April 19, 1883.

284,154. RELIEF-VALVE FOR RAILWAY PRESSURE-BRAKES: Robert J. Wilson, Pittsburgh, Pa. Filed March 22, 1883.

284,155. RAILWAY-RAIL AND FISH JOINT, ETC., FOR RAILWAY RAILS: Frederick Charles Winby, Westminster, England. Filed Feb. 17, 1883. Patented in England June 7 1882, No. 2,678.

284,157. METALLIC RAILROAD-TIE: John W. Young, Fort Moroni, Ariz. Filed March 9, 1883.

Inventions and Inventors.

THE New York *Sun* printed the following admirable article in a recent issue. It (the article) is worthy of preservation for reference. The writer is a master-hand at saying a great deal interestingly in a few words:

The number of successful inventors is always large, but the number of unsuccessful ones is very much larger. Only the other day 17,000 models of rejected inventions were sold for old junk. There is always somebody working at the unsalable problem of perpetual motion, or making a flying machine. It not infrequently happens that, after a patent has been refused to an inventor, a subsequent application is granted by a different examiner.

It sometimes happens that a patent is granted to one man after somebody else has failed to receive a patent for the same invention. This is a fruitful source of litigation. Indeed, litigation about patent rights is so common that in the introduction of any valuable patent the legal expenses of defending it are a large part of the capital required. Immense sums were spent in defending Morse's patents for telegraphing, and the various patents for sewing machines, India rubber manufacture, and of the inventions that have revolutionized industrial processes. But, when rights are once established by law, the profits are enormous. It was shown in a recent case before the United States Court, that for royalties alone on the manufacture of barbed fence wire more than one million dollars a year were paid.

Inventors are now chiefly busy with electricity, and the Patent Office is deluged with devices for making new uses of the modern marvel, or for using it with new appliances. Many of these inventions run in the direction of motors. The opinion has gained some ground lately that storage batteries of electricity are not as successful as was at first expected. It is asserted by some that no storage battery ever gives out as much electricity as it receives, and that every moment decreases the amount yielded. Edison says the best storage battery is a ton of coal, which can be used at any time to drive a dynamo machine. Others, however, still think that the storage battery will produce wonderful results.

Inventors have always sought to utilize the forces of nature for the conservation of power. A good deal of time and money have been spent on efforts to utilize the force of the rise and fall of the tide. According to some plans the water is to be stored in a reservoir at high tide, and used to turn a water-wheel when the tide falls. Another plan is to get the power from the rise and fall of a float. There used to be a tidal mill at Astoria and another at Charleston, S. C. The large amount of land required to get the requisite area of water surface is considered an insuperable objection to tidal mills.

A good deal of money has been expended on solar engines, in the hope of getting power out of the sun's rays. John Ericsson, the inventor of the Monitor and a thousand other things, has made some beautiful solar engines, and not long ago an inventor had a model of a solar engine on the top of the Cooper Union building, and managed to get up steam in a boiler. The trouble is, however, that the sun does not always shine, and the solar engine, to be of any practical use, must be accompanied by a storage reservoir of power, that can be kept for a rainy day. After all, coal is nothing but the heat of the sun stored in past ages for present use.

There is no telling of what great value the discovery of the simplest fact may be. When bromine was discovered by Ballard in 1824, nothing of importance was expected from it. Now it is a valuable factor in photography, and a useful remedy for nervous affections.

Capital is never wanted to try even the most foolish inventions. Not long ago an inventor had an idea that he could, by the use of a naked wire, produce a return current, and avoid electrical disturbances in cables. He could have got the capital to lay a long cable under ground to try his experiment. He was with difficulty dissuaded from doing this by a practical man, who saved him lots of money by wrapping several miles of cable about a barrel and arranging the naked wire as proposed by the inventor. The result was a complete failure, but the cost of the experiment was comparatively trifling. This is an illustration of the large amount of money that can be wasted through ignorance. Men will work away at an idea with no knowledge of what has been done or what can be done, only to discover at the end what they should have known at the beginning.

A good deal of money has been spent in the effort to introduce ice machines. There is, however, a strong competition to be encountered, since ice may always be had for the gathering, and transportation is cheap.

Fire escapes are numbered by the thousand. Hardly a day passes that the Fire Commissioners are not compelled to test some new plan. A good deal of room is taken up in the Patent Office with the models of these contrivances.

A very good example of the facility with which capital can be secured to promote the most chimerical ideas may be seen in the story of the Keely motor. The stockholders have been pretty thoroughly bled already, but are compelled to bleed still more in the hope of saving what they have already expended. The varying fate of capital invested is seen in the contrasting results of the two steam heating companies in New York city, one of which has proved a most lamentable failure, while the other has had a measure of success. It is not so certain that money invested underground will always return a fair interest. It may be necessary to incur great expense when an underground cable gives out, as the whole route may have to be dug up to find the break.

Accidental discoveries have supplied some of the most valuable processes of the industrial arts. It is said that the rolling of cold iron was first suggested by the fact that a workman who was placing a piece of hot iron in the rolls carelessly permitted his tongs to be drawn in. He noticed that they were rolled, and not broken. He called the attention of the Superintendent to the occurrence, and this led to investigation and experiment, and the discovery that cold rolled iron is equal to steel for shafting purposes. The process of rolling iron cold was not long afterward patented, and millions of dollars have been made out of the patent.

There are many similar instances where observing work-

men have called attention to valuable processes. A signal one was in the early period of the cotton manufacture, when a good deal of trouble was caused by the cotton sticking to the bobbins. All the workmen in the mill were delayed by the necessity of stopping work to clean the bobbins. At last one workman found a way to obviate the trouble. He, and he alone in all the mill, had clean bobbins. For a long time he kept his secret to himself. He finally revealed it on the promise of a pint of beer a day for life. His secret was to "chalk the bobbins." That little scraping of chalk on the bobbins saved millions of dollars a year, and the observing workman got not only his beer, but a competence.

Each extension of modern enterprise and skill brings with it a train of inventions. The railway, the telegraph, the steamboat, the development of iron, electricity, and petroleum, have each produced a long line of inventors more or less successful, so that each of these industries might have a creditable exhibition by itself.

Aid for Indigent Inventors.

THERE is, perhaps, nothing sadder in the life of the trade journalist than the occasional visits he receives from machinists or others who have devised some new invention of value to the world, but who through poverty have either been compelled to sell it for a song or have waited for the "good time coming," only to see some unscrupulous person walk off with it and make a fortune. No one can read of the great struggles of Goodyear during his experiments in the production of rubber goods without a feeling of profound pity; nor can one, without indignation, talk with a gray-haired old man in a neighboring city, not fifty miles from Cleveland, concerning the manner in which certain railway magnates swindled him out of the first model of what is now the Pullman Palace Car. While America is the most generous country in the world toward her inventors, yet scores and hundreds there are who are sharing the proverbial inventor's fate because of lack of capital and the necessary incitement to use their inventive talent for the highest ends. It is with pleasure, therefore, that we hail the Humanitarian Invention Association, which owes its existence to the careful planning of some of the large-hearted professional and business men of Youngstown, Ohio. Lest there be any doubt as to the genuineness or the practical a ms of the association, we mention as its President, Samuel G. Hair; as its Vice-President, Hon. L. D. Thoman, member of the Civil Service Commission; as its Secretary, Dr. James F. Wilson, and as its Executive Board, A. B. Cornell, Hon. L. D. Woodworth and Milton S. Tracy. These names are surely a guaranty that there is nothing chimerical in the enterprise. Briefly stated, the objects of the association are threefold: First, to develop the inventive genius of the country; secondly, to aid indigent inventors in procuring patents; thirdly, to make for valuable patents the best financial return possible. The basis of the work is a fund of $10,000 guaranteed by the ten members composing the association. Out of this fund are to be paid cash premiums for the best article invented in any particular line. For instance, the association now has a standing offer of a cash premium of $3,000, open till January 1, 1884, for the best invalid chair that can be devised. Inventions for which premiums are paid are to be handled by the association, one-third of the net profits being paid the inventor, one-third divided equally among all the competitors, and the remaining third being used by the association in the maintenance of an ample fund for payment of future premiums. To meet contingent expenses, an entrance fee of one-half of one per cent. of the cash premiums offered is required—in the case of the invalid chair offer, $15. Awards are to be made by a board of five competent and disinterested persons, and unsuccessful competitors, in addition to their share of one-third of the profits arising from the prize invention, will be aided in procuring patents on their own inventions, if worthy. Other commendable features of this novel organization might be dwelt on did space allow. From one of the directors we learn that the Secretary already has a very large correspondence, and that the benefits of the association are even now beginning to make themselves manifest. It certainly deserves well, for it is both practical and humanitarian.—*Trade Review and Western Machinist*

Rail Joints.

WM. S. HUNTINGTON, whose pen is not strange to the readers of the RAILROAD JOURNAL, has contributed to the *Railroad Gazette* a communication on rail joints, the substance of which is of considerable value.

There is scarcely anything more desirable in railroad operation than a joint fastening and support that fills the bill, but it is certainly an unwise policy to equip a long line of road with fastenings that have not been subjected to a thorough practical test. If a railroad official is not satisfied to use the best fastenings in use, and has faith in a dozen, more or less, of recent invention, he can give them all a trial and select the best as a standard.

A recent trip over a road some hundreds of miles in length, a good share of which has lately been relaid with steel rails on new ties and well ballasted, showed that the managers have made a mistake in their selection of joint fixtures. They are using a splice-bar (4-bolted) that is quite extensively used, and a nut-lock that is bringing wealth to the patentees and manufacturers; but the joints are all loose and the rails are pounding down at the ends. Too much noise for a first-class road caused the writer to pay attention to the matter and discovered the cause of the clatter, which reminded one of the early days of railroads, when the speed of the train was known by the sound of the wheels at the joints, which is not the case on our best roads of to-day.

While most inventors of rail-joints fall short of their aim, others overdo the thing and get the joints too stiff. It is of the utmost importance that rails have the same strength at the joints as at other parts and no more. There is a certain amount of depression of all rails, and this keeps a certain distance in advance of the wheels, causing a "wave of depression," and the most desirable joint is one that will transmit the wave unbroken to the next rail and return to its normal position. If the rails are bound by too rigid clamps or grips, the wave is broken, and rolling stock is badly shaken up in consequence.

A brief consideration of the various forces which tend to destroy joints will give inventors of those fixtures something of an idea of what is expected of them, when they in-

form the railroad public that they have invented a perfect rail-joint. It must be capable of resisting vertical strains varying from a few hundred pounds (the weight of the wheels of an empty car) to as many tons (the weight on driving-wheels), providing always that they yield to the pressure the same as the middle of the rails, and retain sufficient elasticity or spring to regain their position on a plane with the rail centres. The splice-bars and other vertical supports must be of such a nature that they will not bend and set, under any amount of pressure. The nuts, keys, wedges or other fastenings must resist the ever-changing jar and vibration incident to the various weights of wheels and speeds at which the trains are run, as for instance: The first load is a heavy locomotive truck, the next the heavier drivers, then the lighter tender trucks, then the trucks of an empty freight car, followed by those of a loaded one, and so on through a long freight train; the amount of depression changing from the minimum to the maximum and *vice versa*, with astonishing rapidity. And from the fast express train to the slowest freight, the joints are subjected to a punishment ranging from the slightest to the most severe, the light taps sandwiched between the heavy blows in a thoroughly demoralizing manner, one blow being delivered before the joint has fully recovered from the preceding one. All this has a tendency to wear all the parts that enter into the make-up of a rail-joint, which soon causes a vertical motion of the rail ends, throwing them out of their plane and exposing them to the pounding of the wheels, which is an expensive operation. The lateral strain on joint fixtures must also be provided for. Bolts may be made fast with the most approved nut-locks, keys or other devices, but they very soon get loose, and then come rapid destruction of rails and ditching of trains. Bolts that are made very tight are liable to break by contraction in severe weather, or if not broken they stretch so that they will be loose when the weather gets warm, and no nut-lock has yet been produced that will compensate for contraction and expansion, and the cranky, hashed-up vibrations and mixed strains before mentioned. The splice-bars must be kept snug to the rails or they are no support whatever; and the splice-bars in common use and the general make-up of the average rail-joints are the most unmechanical and unsatisfactory of all railroad appliances. Another source of trouble with the common splice-bars is that when they become a trifle loose (and it is exceedingly rare that they are perfectly tight), the end of the rails will "cock up" when the wheels have passed the joint. In this way the ends of the rail have a vertical motion sufficient to expose them to severe pounding. Suppose the rear truck of a car has passed the joint just far enough to bring the forward wheels of the next car close to the joint. The end of that rail will be depressed, while the next rail will be raised all that the looseness of the joint will allow. The first mentioned truck depresses the rail on which it rests six or eight feet from its end. A tie between the wheel and the joint acts as a fulcrum, and the end of the rail rises at the same time that the end of the adjoining rail goes down. Thus the rails have a rocking motion, a tie a few feet from the joint acting as a fulcrum, and at the time that one rail goes down the other rises with the above-mentioned results. And the contraction and expansion of the rails have a destructive effect on joints; also, the counter-weights on driving-wheels, and it is difficult to conceive of anything that presents a greater array of difficulties to be overcome than the rail-joint. Every destructive mechanical force imaginable, and the elements also, are in constant warfare with that most abused of all railroad appliances. A perfect joint must be to all intents and purposes the same as any other parts of the rail, as to strength and elasticity. Many or all of the joints now in use would be far more serviceable if they were better cared for by trackmen. Many joints are destroyed by too much power on the long wrenches, by which the bolts are twisted off. Fairly snug is tight enough if kept so.

Important Railroad Invention.

MR. THOMAS H. GIBBON, of Albany, has invented a compound rail and boltless rail-fastener, which, it is claimed, possesses several points of special merit. Among them are the following, described by the *Railway Age:* That it forms practically a continuous rail, having all the smoothness of the old "compound rail," with all of its objections removed. It preserves the joint ties, the spikes being driven through the lugs and plate, locks the fastener to the rails, which prevents the spikes from working or becoming loose, and thereby preserves the fibre of the timber. This joint-fastener removes the weakness of the rail caused by drilling, punching, and slotting, and gives at least two-fold greater strength to the joint over any other portion of the rail; it also removes the expense in track maintenance occasioned by low joints. The shoulder of the fastener being boxed into the tie also makes the tie act as a tie rod, and materially assists in preventing the spreading of the track. Many derailments are no doubt caused by rails being cut too long, thereby throwing the rail-holes out of line with those in the fish plate, consequently necessitating the forcing of the bolts, and causing concealed defects which soon result in actual fracture of the rail at the weakest point; and also leaving no room for necessary expansion, thereby occasioning kinks in the track, accidents from which are invariably reported under the head of "unknown causes." This joint-fastener allows for any amount of expansion necessary in the judgment of the track engineer, without any regard to the length of the rail. "Creeping of the track" is practically impossible with this fastener, the rail being continuous and firmly locked to the ties. The expansion and contraction will, therefore, be uniform throughout the whole line. It also allows the wheel to glide over the frog without any perceptible jar, thereby removing one of the principal destructive agencies to wheels, track, and machinery. Although entirely dissimilar to the chair joint, fish plate, and fish and angle joint, it combines all the good features of each fastening without any of their defects.

THE custom of carpenters engaged in repairing old buildings, of carrying a small lump of lard or tallow on one of their boots or shoes, is much to be commended. A brother scribe records his observations of an experiment in driving nails into hard-seasoned wood, fairly dried. He says that the first two nails, after passing through a pine board, entered about one inch, and then doubled down under the hammer; but on dipping the points of the other six or eight nails into lard, every one was driven home without the least difficulty.

The DuBois Steam Generating, Superheating and Boiler Feeding Apparatus.

THIS invention has three distinct features, viz: 1. Instantaneous generation of steam from a spray. 2. Superheating the same, and 3. Automatically feeding the water to the generator by means of a weighted piston, which gives pressure to the water and sprays it in the generating cylinders. The apparatus may be utilized as a whole or in parts. For instance, the filming and superheating cylinders may be attached to any kind of a boiler or generator for the purpose of superheating the steam, or the automatic feeder may be attached to any kind of a boiler or steam generator for use (pumps or injectors requiring power to run them being entirely dispensed with.)

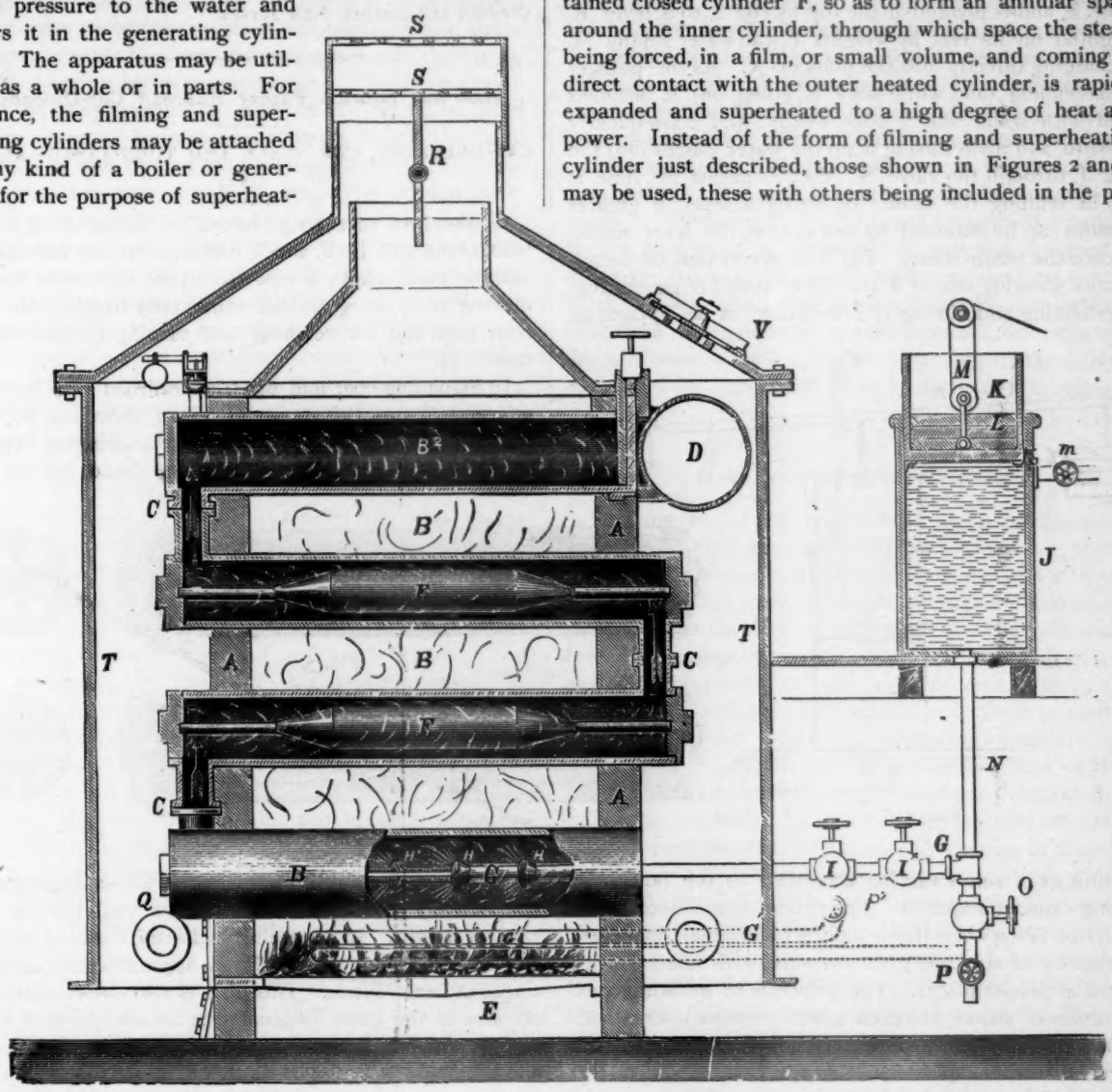


FIG. 1.

Fig. 1 shows the apparatus as a whole. The tank or standpipe J, is filled with water from the hydrant by means of valve m. The tank is provided with a piston K, with weights L. The pressure caused thereby causes the water to flow through pipes N and G, and is sprayed in the generating cylinder B. The steam thus generated is forced through outlets C, through the filming and superheating cylinders B^1 into superheating cylinder B^2, and finally into receiver D, from which it is distributed to pipes for heating buildings, or for power or other purposes. T is an outer shell of the apparatus which incloses an air space around joints of the apparatus, which are all on the outside of the furnace wall A, and away from direct contact with the fire. Q are ventilating doors which, when open, will cause a draft through said air space to keep the joints cool, if desired. R is the damper, and S the spark arrester. The filming and superheating cylinders B^1, are formed by placing within the main cylinder an inner contained closed cylinder F, so as to form an annular space around the inner cylinder, through which space the steam being forced, in a film, or small volume, and coming in direct contact with the outer heated cylinder, is rapidly expanded and superheated to a high degree of heat and power. Instead of the form of filming and superheating cylinder just described, those shown in Figures 2 and 3 may be used, these with others being included in the patents covering the invention. The principle of the superheaters is to divide the steam into small volume and subject it to the greatest heat; thereby getting the best possible results from the heat generated in the furnace with the smallest percentage of fuel. The water may be forced direct to the generator by closing the valves O and P^1, and opening the valves I and I^1; and by closing the valve I^1 and opening valves O, P^1 and I, the water will be forced through the coil G^1, running through the furnace E, and thereby become heated before being sprayed in the generator. The valve P is for discharging water from the pipes and tank after close of work. Any suitable device M, may be used to raise the piston or plunger. By this means a very little or no elevation to the tank, the pressure may be made to be considerable. Of course, the higher the

elevation of the water and the tank, the less weight will be required on the water. A point may be reached where no additional weight to the water will be required, but it will rarely be convenient to construct the standpipe in a building high enough. In place of the piston just described, that shown in Fig. 4 may be used. In this case, the piston or plunger K, is provided on the bottom with a valve S, and is pivoted at the top by rod r, to a lever R, weighted on its end by weights L, the water supply M, discharging directly into the plunger K. As the plunger is descending (and while work is going on), it becomes filled with water which adds weight, and consequently pressure, and upon raising it up the water passes into the tank J, through the valve S. By this means no time is lost in refilling the tank. By using a lever, a greater pressure can be obtained by less weight, the lever acting to force the piston down. Fig. 1 is an end view of the apparatus, showing one of a number of series of generating, superheating and filming cylinders used in an apparatus,

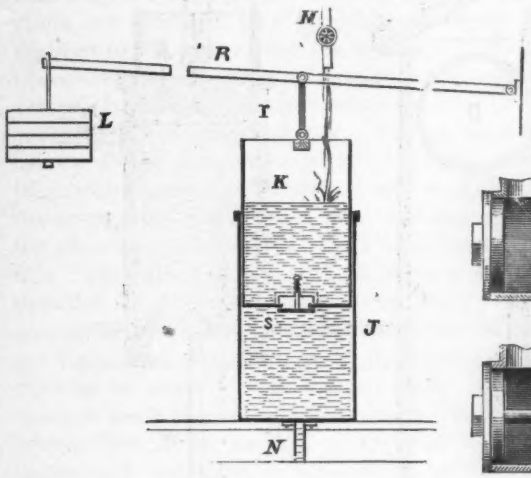


FIG. 2.

the number of series varying according to the power or heating capacity required. The cylinders are necessarily small, not being over three inches of internal diameter, and capable of standing great pressure, with safety-valves located at proper places. The principle of instantaneous generation of steam, however, is well enough understood by the reader to know that it is not attended with the danger of terrific explosions, as in the case of the boiler method, which occur when the water gets low and the boiler highly heated, causing a considerable body of water to instantly flash into steam with all its terrible effects. In this case, only a diminutive spray is kept flowing to the generator, the quantity being regulated by setting a valve for that purpose, and the quantity thus entering the generator is constantly generated into steam as fast as it enters, with no surplus to explode. The pressure by this apparatus may easily be developed to several hundred pounds to the square inch, and of course the steam contains a corresponding amount of heat. Independent of the increased motive force generated with a small percentage of fuel, the high degree of heat contained in the steam of high pressure will be found to have an advantage in heating buildings, and especially in heating buildings on a large scale, as in the case of running pipes underground and conveying the steam through these pipes a long distance, where common low steam is liable to condense, and spend the greater part of its force before reaching the building to be heated. In the many fields of industry where the apparatus may be employed, either as a whole or in parts as attachments to common boilers, the invention should meet with great success.

The inventor and proprietor, J. S. Du Bois, can be addressed at Camden, New Jersey.

Hall and Stock's Patent Railroad Car-Unloader.

CAR-UNLOADER, CAR SCALE AND TURN-TABLE—ALL IN ONE.

A MACHINE recently perfected by Almon Hall, of Toledo, Ohio, and H. F. Stock (the well-known railroad excavator man) marks a new departure in devices for removing coal, ore, grain and other bulk freight from railroad cars, and for weighing and turning locomotives or cars.

In unloading coal and ore from railroad cars into vessels and chutes, the usual process of shoveling the load into tilting buckets suspended from a swinging crane is slow and expensive. Where dumping cars of special con-

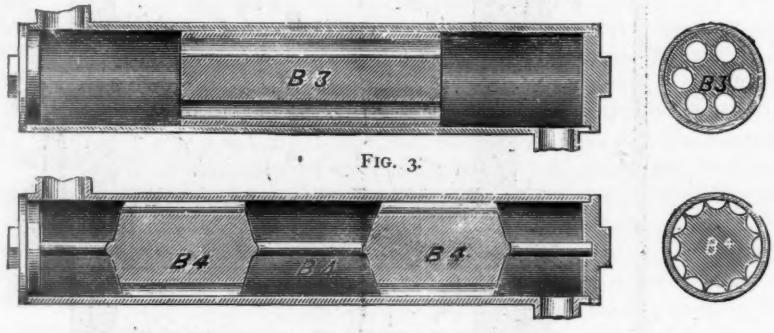


FIG. 3.

FIG. 4.

struction are employed, their capacity is less than that of the ordinary flat car, and they can be used but for one class of freight. In unloading such cars, elevated, permanent chutes are usually employed, approached by inclined tracks of heavy grade. This plan is also objectionable on account of the great original cost of the elevated ways, chutes and cars, and from the fact that valuable docks, and other spaces arranged on this plan, are rendered practically useless for other purposes.

The machine of Messrs. Hall and Stock is designed to avoid each of these objections, by providing means for lifting an ordinary car with its load, bodily, to any desired height; and for turning the car as upon a turn-table at any height to which it may be lifted, and at any point to which it may be lifted or turned; for tilting the car to any desired angle so that its load may slide or shoot from the end of the car, thus avoiding the necessity for derricks, special cars, inclined tracks, permanent chutes, etc. This machine when not in use is below the level of the track, out of the way of moving trains and out of sight.

This machine is especially valuable on low docks, in loading into vessels which, when light, set many feet above the track, but which settle down in the water as fast as loaded.

The device consists of a table or platform, of sufficient

length to receive a car, formed of I beams suitably braced and tied, upon the tops of which are bolted the track rails. The table when not in use rests on suitable supports, with its rails in line with the track. The car to be unloaded is attached to the table by chains or other suitable means. The table at its centre is supported, and oscillates upon trunnions journaled upon the top of a strong hydraulic lift. The machine near the top of the lift is provided with a small, double, reversible steam engine, supplied with steam through a flexible hose, which engine performs the operations of swinging and tilting the table. The upper section of the movable, vertical cylinder of the hydraulic lift is arranged to rotate horizontally, carrying with it the table or platform and the car which it supports (like a turntable), and is connected with the engine by suitable gearing. The table or platform is provided at either side with toothed racks of segmental form having for their center the trunnions upon which the table tilts. These racks (which are placed directly beneath the beams of, and serve as trusses for the table) are engaged by two pinions, one on each end of a shaft extending through the supporting column, which shaft is revolved by means of worm gearing connected with the engine. The pinions and curved racks being set in motion, the table with its car is tilted, the end board of the car swings out, and the load slides from the car. The worm gearing referred to constitutes a constant safety lock, preventing tilting motion of the table except when the gearing is moved by the engine. By means of clutches the swinging or tilting mechanism may be thrown in or out of gear at will.

Connected with the hydraulic lift is a pressure gauge, showing the weight of the load and car both before and after unloading. By means of this pressure gauge the machine may at any time be used as a car scale. The machine is designed to lift the heaviest car-loads of coal or ore to a height of from twelve to fifteen feet (or higher if necessary) and discharge the same, in from five to seven minutes. Machines arranged for use in grain elevators unload cars in a still shorter time.

It is claimed by the proprietors that this device furnishes the cheapest and quickest known means for unloading cars. The idea of picking up a car loaded with coal or ore, and emptying it as one would a scuttle of coal, is novel and bold; but the thing seems entirely feasible by means of the machine above described, and it would seem that the problem as to how to unload the common, flat car cheaply and quickly, which has so long and seriously puzzled railroad men and engineers, is solved,

---

SPARK AND CINDER ARRESTERS.—A correspondent of the *Boston Advertiser*, "F. W. M," writes under date of August 23d, as follows: "A paragraph in your issue of the 21st instant states that several attempts to abate the smoke and cinder nuisance on locomotives have been made by extending the tops of the smoke-stacks by means of pipes, making the point of emission the back end of the train, and points out the evident impracticability of the device. It is, perhaps, not generally known that this subject has received very careful attention and experiment on several of the railroads running out of this city. The Old Colony road has at this time some sixty locomotives equipped with spark-arresters and cinder chambers, which not only prevent the escape of any appreciable quantity of solid matter from the stack, but collects all the unconsumed products of combustion from the fire-box, which is afterwards prepared, by screening, for use under the stationary boilers at the company's shop. The device has been in use on this road for over two years, and is being applied as rapidly as possible on all the engines operated by the Old Colony. The Boston and Albany Railroad has also experimented for about six months with this innovation, which by the way is exceedingly simple and inexpensive in construction, and is used without detriment to the steaming qualities of the locomotive. Three of the spark-arresters, two on local trains and one on a through express, have proved highly efficient, and their use has given great satisfaction to the officers, employés and patrons of this corporation." To him the editor replies in the subjoined words: "Perhaps 'F. W. M.' misapprehends the purpose of the paragraph in question. It was not designed to throw any doubt on the practicability of devices—several of which have been noted in these columns—for lessening or abating the smoke and cinder nuisance, but only upon the particular mode in question—carrying smoke-pipes to the rear of the train—which up to date has not been successful."

Isaac N. Hoyt's Car-Coupling.

THE inventor of this improvement, who resides at Augusta, Wisconsin, has as his objects in its device, to construct a draw-bar or buffer in such a manner and with such a combination of parts, as to hold the link and pin in such position when the cars are uncoupled that they will couple themselves when brought together, and to permit of such another arrangement of parts as to prevent coupling if it is desired to push the cars, and yet leave them in position to couple the next time they are brought together.

The means adopted for the accomplishment of these ends are indicated briefly in the subjoined description.

The bar or buffer by which the freight cars are drawn, is in present practice provided with a recess in the outer end, which receives one end of a link. A hole is made vertically, through which a pin passes, as also through the interior of the link. The cars are attached by the link and the two pins. The cars when so attached have slack, to permit them to be started one at a time, and permits each car to sway sideways. To permit the necessary slack and sway, the link must be loose around the pin and fit loosely in the recess in the buffer. When the cars are to be coupled, it is necessary to direct the link to its position in the recess of the buffer, and when they meet to drop the pin through. To permit the slack and sway, and yet couple automatically, Mr. Hoyt constructs the buffer with a recess for the link and hole for the pin as at present constructed, but opening into the recess from the rear he makes a hole vertically through the buffer, the front and rear ends of which slant upward and backward. The sides of the hole run longitudinally with the buffer, and are a less distance apart than the width of the link. In this hole he places a weight, free to slide up and down in it, which, guided by the slanting ends, recedes as it rises and advances as it falls. It is provided with a jaw which, with the lower surface of the recess in the buffer, grasps the link immediately behind the pin. The weight has a slanting side, which, when the link and pin are both removed, and the weight is resting on the bottom of the recess in

the buffer, shuts partly over the upper hole for the pin and prevents the pin from falling through. To the upper side of the weight is attached a rod, having the same slant as the rear end of the weight, and forming a part of the weight. Over the hole in the buffer is placed a cap, sufficiently concave on its lower surface to permit the weight to rise until the lower edge of the jaw is as high as the upper surface of the recess in the buffer, but having a hole through which the rod may slide. To the pin is hinged a dog, near its upper end, of sufficient length to reach to the rod of weight when the pin rests in the upper hole in the buffer. When it is desired to couple two cars, the link is placed in the recess in the buffer of one. The link is held horizontal by the jaw of the weight resting on the end of the link back of the pin. The other car-buffer is left with the weight down, and the pin in the upper part of the hole, retained there by the face of the weight. When the cars meet, the link enters the recess in the buffer and pushes the weight backward and upward, releasing the pin, which falls through the link. Sometimes it is desired to push a car to some point and leave it, and also to leave it in position to couple on again. This is accomplished by the dog attached to the pin, and the rod of the weight. The pin on the car to be pushed is raised out of the link and the foot of the dog placed against the rod. The weight may then be raised and lowered above the link without disengaging the pin; but if the link be removed, the weight falls to the bottom of the recess in the buffer, carrying the rod below the top of a plate, disengaging the dog, but retaining the pin by the face in position to couple.

Mr. Hoyt claims that his coupling is almost inexpensive, while effective, simple and durable.

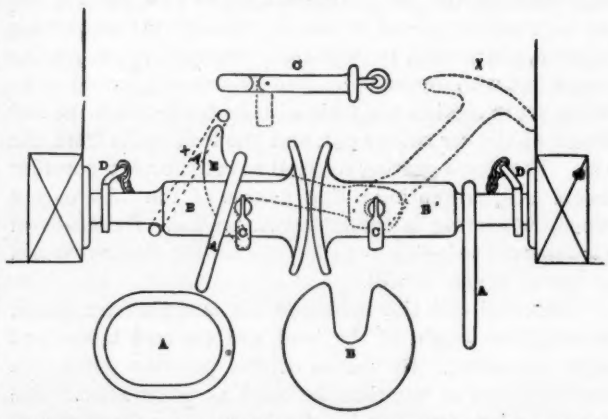
The Post Refrigerator.

THIS invention is found to answer the two purposes of saving time and preserving its contents without injury throughout the longest railroad journey. It is supplied in three different forms, by The Post Refrigerator Car Company, of Boston. At the recent Exposition of Railway Appliances, held in Chicago, it attracted great attention, and the peculiarities of its construction were greatly admired. The first form of the Post Refrigerator is intended for use in the transportation of fresh beef, fish, etc. Its cooling surfaces are exceptionally large, and it contains provision for regulating the temperature of the dry and cool air which freely circulates within it. This form of car utilizes the pickle, which is retained in a tank at the bottom, between the two ice tanks. In the second form the ice tanks are at the top, giving large space for eggs, fruits, butter, etc., in the body of the car. The racks made by The Post Refrigerator Car Company for loading cars of this style are a highly ingenious and useful invention, saving much time and labor. The remaining form of car is divided into sections, and consists of a row of circular tanks sixteen inches in diameter, with a three-inch air space inclosed again. It is well adapted for the local transportation of perishable goods. In all three forms the cooling mixture used is composed of salt and crushed ice. We learn that the Post cars are clean and dry on their interior surface.

The company contracts to furnish cars, either on mileage rates or on yearly royalties, for the transportation of perishable goods for any distance. Inquiries should be addressed to Robert H. Waters, General Manager, "The Post Refrigerator Car Company," Boston, Massachusetts.

The company is also prepared to furnish estimates for the erection of coolers, under their various patents.

An Effective Car-Coupling Used in Chili.



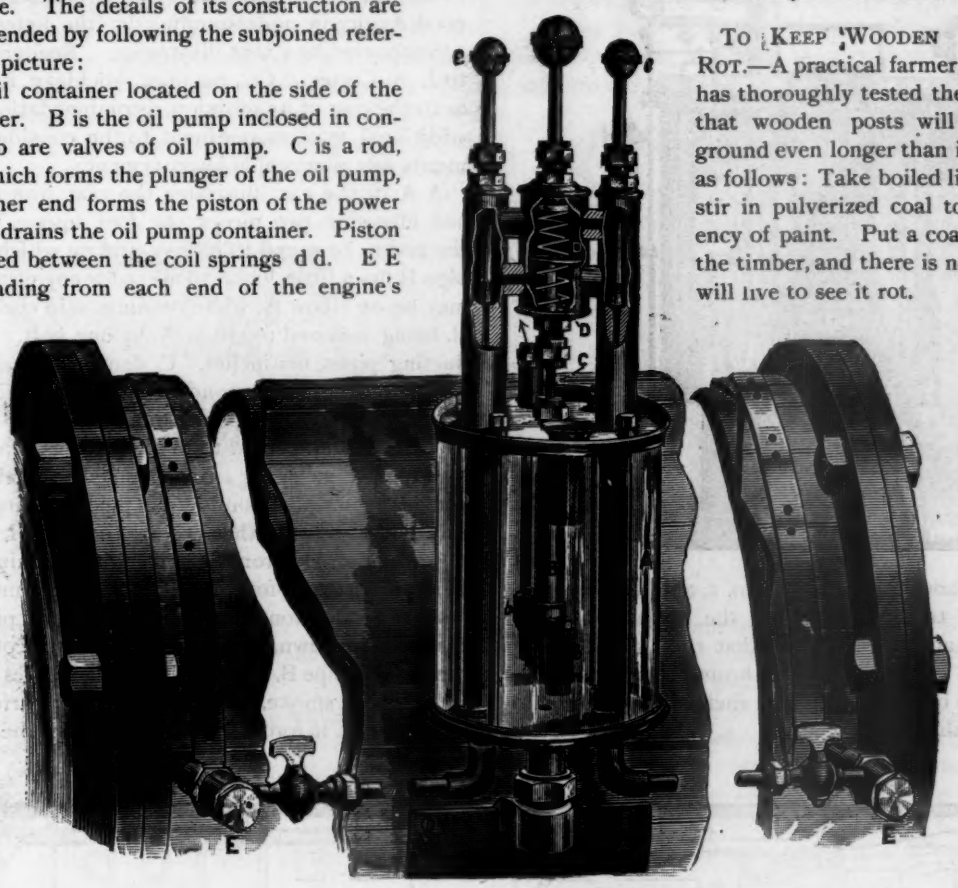
HEREWITH is the sketch of a car-coupling in use some years on the Autofajasta road, Chili, on nearly eight hundred cars and coaches, without causing a single accident. The cars on arrival lacked A, C and D, and it was found that any slight bunching up of the train when in motion, was sufficient to uncouple the cars. The oval link was tried and turned out a complete success. It is impossible for the hook to rise sufficiently to clear the coupling-pin while the oval link remains on the draw-head, and it is only by moving it back to the neck of the draw-bar that it can clear the point, as is shown by the dotted lines at X, I, showing the oval link being lifted and drawn back, preparatory to uncoupling the cars. This arrangement is interchangeable, both ends of cars being alike, as also of engines. The next thing invented was the drop-link C, as the ones supplied with cars were continually working out to which was added the fastening to the loose ring D, by a small chain. When E is left in the position X, any slight shock caused by the engine backing, is sufficient to cause the hook to drop into its place. The oval link is then passed over and all is safe.

IN Maryland at a somewhat earlier period (than 1797), we find an advertisement in the *Maryland Gazette* of a servant who offers himself "to wait on table, curry horses, clean knives, boots and shoes, lay a table, shave, and dress wigs, carry a lantern, and talk French; is as honest as the times will admit, and as sober as can be."—*Harper's Magazine.*

The Forest City Lubricator.

ACCOMPANYING is an engraving of this valuable invention, patented July 10th, 1883, by W. W. Brisben, of Cleveland, Ohio, who has had an experience of fifteen years with the leading iron and steel companies of that city. The Forest City Lubricator is said to be a solution of the problem of automatic lubrication, being in successful operation on some of the first engines in Cleveland, and elsewhere. The details of its construction are easily apprehended by following the subjoined references to the picture:

A is the oil container located on the side of the engine cylinder. B is the oil pump inclosed in container A. b b are valves of oil pump. C is a rod, one end of which forms the plunger of the oil pump, while the other end forms the piston of the power cylinder that drains the oil pump container. Piston C is suspended between the coil springs d d. E E are pipes leading from each end of the engine's



THE FOREST CITY LUBRICATOR.

cylinder to the power cylinder of the lubricator connecting one with the top and one with the bottom; thus the valves of the engine operate on the piston head in the lubricator cylinder the same as they operate on the piston in the engine's cylinder. e e are valves for regulating the pressure and regulating the length of stroke by the action of the governors of the engine. The pressure of steam in the cylinder is increased or diminished according to the load carried. This same change in the pressure of steam will be had in the power cylinder of the lubricator and will vary the stroke of the oil pump accordingly.

Among the advantages of Mr. Brisben's invention are: It starts when the engine starts, stops when the engine stops, and will increase and decrease the supply of oil according to the load that the engine is pulling. Thus, if the lubricator should be set so that it would just supply the wants of an engine running light, any additional work thrown on the engine would increase the length of the stroke of the oil pump, and also increase the flow of oil accordingly. This lubricator is recommended because it will take care of the valves and cylinder of an engine; for if a valve needs oil at all, it is when doing its hardest work, and the amount of oil that would supply a valve working light is not enough to protect it from injury when the engine is doing hard work. It will readily be seen that it is a perfect economizer, from the fact that it is not necessary to feed a surplus of oil while working light, to make up for the amount needed when the pull is hard.

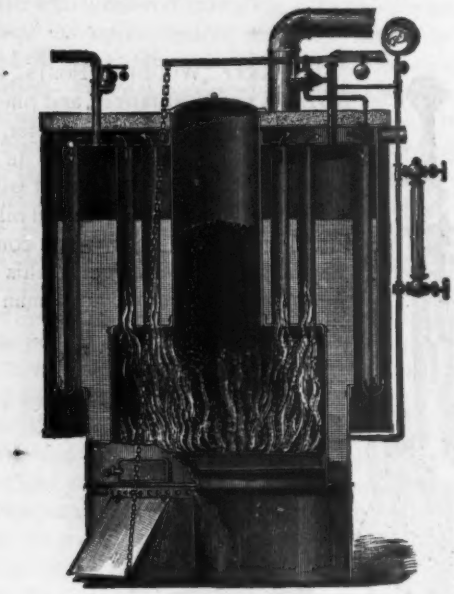
TO KEEP WOODEN POSTS FROM ROT.—A practical farmer, and one who has thoroughly tested the matter, says that wooden posts will last in the ground even longer than iron if treated as follows: Take boiled linseed oil and stir in pulverized coal to the consistency of paint. Put a coat of this over the timber, and there is not a man that will live to see it rot.

A NEW STYLE OF SLEEPERS.—It is stated by the New York *Tribune* that the Boston and Albany, and the New York, New Haven and Hartford railroads are to put boudoir sleeping-cars on their express line between Boston and New York after October 1. These cars, according to the description, are radically different from any sleepers in use in this country, though they have been in general use on the Continent of Europe for some years. Instead of "sections" lengthwise of the car, there are a series of state-rooms or "boudoirs" opening off a corridor along one side of the car. Each of these boudoirs has one or two sofas, transverse of the car, the backs of which lift up and form the upper berth, while the seat forms the lower. Vestibules at either end of the car provide ample toilet and heating, or cooling facilities, and the ventilation is said to be perfect.

WHAT never ran smooth yet, can hardly be expected to change its character for us; so we must take it as we find it, and fashion it into the very best shape we can by patience and good-humor.

Gorton's House Heating Steam Generator.

THE Gorton Boiler Manufacturing Company, (Limited), No. 110 Centre street, New York, find that the steam generator illustrated and explained in this article, and in operation in numerous buildings, gives great satisfaction, because simple in construction, base burning, durable and economical, and efficient and pleasant in use.



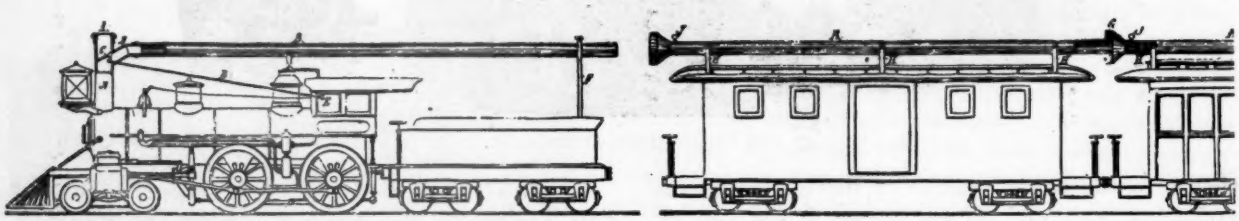
The boiler shown in the cut is No. 2, and represents the use of vertical tubes surrounding the magazine or coal reservoir and above the fire, so that the heat passes up through these tubes and down through the outer tubes and thence up between the outer shell of the large boiler and jacket, to the smoke pipe.

The Gorton boilers are base burning and self feeding. They are furnished with a non-conducting galvanized iron jacket, and no brick or mason work is required in setting. The iron jacket envelops the boiler, confining the heat to generate steam, instead of wasting fuel to heat brick mason work. The door opens into the fire at the grate, so that the fire can be seen and any clinkers readily raked off. The cast-iron top or cover to boiler is made in sections, so that parts of it can be removed without disturbing boiler or attachments, in order that the interior of boiler and flues can be readily reached for any purpose. All or any of the improved attachments used on boilers for convenience or safety, can be used with these boilers. The coal reservoirs are ample to hold coal for from twelve to twenty-four hours' use, and they will keep up steady continuous heat without care of fire or shaking of grate more than twice during each twenty-four hours. The entire surfaces of the boilers and tubes are utilized, the heat passing around and between the boilers and through the tubes to every part.

Cotter's Spark Arrester and Conductor.

COTTER'S spark and smoke arresting and conducting system for railway passenger trains, is described as fully as we can afford space in the next paragraph. There is no difficulty in understanding it; the letter-press being accompanied by a neat illustration. Readers are referred to J. A. Cotter & Co., Saginaw, Michigan, for particulars as to the cost of its adoption, recommendations and other additional matters pertinent to the consideration of its merits as a practicable improvement.

A A in the cut illustrates the cast iron smoke stack and elbow, in two pieces, one foot square, the elbow at the end to be round to receive, and on which conducting pipe B fits a little loose, to allow for any oscillation there may be on elbow A, while running, said conducting pipe B, being fastened to elbow A, by one bolt. B B B, conducting pipes, ten inches. C, damper for turning sparks and smoke through conducting pipe B, while running forward. D, rod to operate damper C, from the cab. E, collar and thumbscrew to hold damper C in the desired position. F swinging swivel hanger, to hold up the rear end of locomotive conducting pipe, running from each side of the tender to the necessary height. I, wire netting to prevent sparks from escaping when running backward. G, receiver twenty-four inches in diameter, movable, to be inserted in the front end of all conducting pipes, over all coaches as shown, to allow a free motion of the end of conducting pipe B, entering it, which receives the escaping cinders and smoke, and also a strong current of air to further assist in forcing the same through the pipes to the rear end of the train; the receiver to cover the end of conducting pipe B, about two inches. J, thumbscrew to hold the receiver in position. On freight locomotives the receiver is placed a little back of the cab, stationary, to give additional draft.



COTTER'S SPARK ARRESTER AND CONDUCTOR.

A GERMAN technological journal points out the fact that a vast amount of valuable steel is lost every year in the shape of pens, that become unfit for writing and are thrown away. Pens are made of the very finest steel, and can be remelted and used again for many purposes. They can be turned into watch springs and knife blades, and can be dissolved and made available in the manufacture of ink. The suggestion is made that the children of the poor should be taught to collect cast-away pens, and thereby save valuable material and earn money.

Stearns's Self-Adjusting Car Axle-Box.

A VALUABLE INVENTION FOR THE COMFORT OF THE TRAVELING PUBLIC—NO HOT BOXES—NO SHOCKS IN TURNING CURVES—ECONOMY ALSO FOR THE COMPANIES.

THE object of this invention is to prevent the lateral binding of car axles in their bearings, by providing efficient means for retaining the journal always in exact line with the bearing in which it works, irrespective of any twist, torsion, or displacement which may ordinarily be brought to bear upon the housing or shell of the journal-box, which, with the *ordinary boxes*, occurs in *turning or rounding curves*, and which from the inordinate friction produced, results not only in the *heating of the journal*, but also in a *large consumption of lubricating material*, the *rapid wearing of the bearings*, and the *straining of the journals and adjacent parts*.

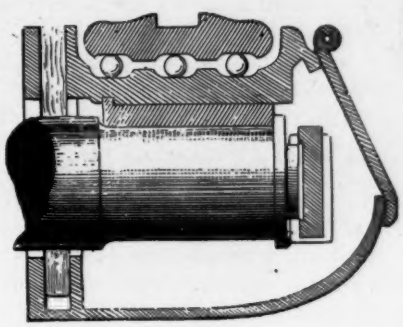


FIG. 1.

Fig. 1, as above, represents a central vertical sectional view of the invention, taken in a plane coincident with the axis of the journal.

Fig. 2 is a plan view of the housing which forms part of the apparatus.

Fig. 3 is a front view and partial transverse section, the front portion of said view being that of the pedestal and equalizing bar.

Fig. 4 is an inverted plan view of the saddle which forms part of said apparatus.

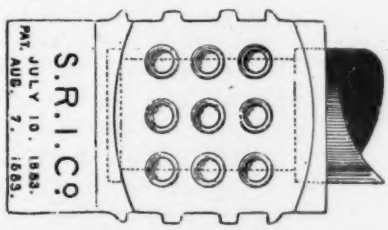


FIG. 2.

The housing or shell of the axle-box may be of the usual or any suitable configuration, except that at its top it is chambered out or hollowed; the bottom of this chamber, however, being substantially flat, and having formed in it cavities corresponding with cavities formed also in the saddle, (see illustrations) between which are interposed chilled iron balls one and one-half inches in diameter, which are so arranged as to keep the saddle out of contact with the chamber, and any weight placed thereon will be borne by them, and the pressure of such weight transmitted through to the top of the housing, and thence to the bearing resting upon the journal, thus keeping the bearing exactly in line with the journal, and consequently in a position affording the smoothest and most perfect contact therewith, thereby *avoiding all undue wearing, heating, abrasion*, and other results of inordinate friction, and preventing when turning a curve in a track that lateral twist or wrenching which is experienced when the parts are rigidly affixed.

A great advantage in this improvement is that it can be applied in connection with the old pedestals, and with any of the usual or known forms of truck; and to *freight cars* without any truck; the expense being mainly that of a new housing or shell, and the simple castings used in connection therewith.

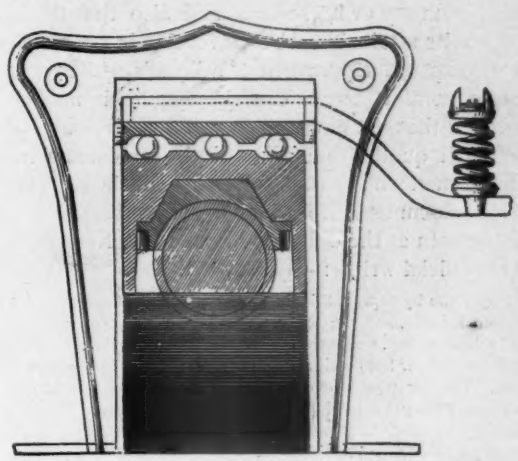


FIG. 3.

The claims made for this box are as follows:

1. A saving of from 50 to 75 per cent. in the running expenses of each individual journal.
2. A doing away with hot boxes.
3. A saving of wheel, rail, brass and journal.
4. A higher rate of speed with absolute safety.
5. An increase of one-third in motor power by the overcoming of friction to that amount.
6. No lateral motion perceptible whether on a straight line or curve.

This box has been in actual operation on several leading roads for nearly two years past, and has demonstrated thoroughly that the above claims can be relied on; and all recommend it as achieving the result long sought, and the simplest and best box ever invented; and negotiations are now pending for its final adoption. * * *

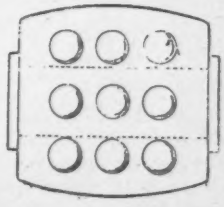


FIG. 4.

In making inquiries upon the matter of the preceding references to the Stearns Patent, a representative of the AMERICAN RAILROAD JOURNAL had interviews with O. S. Stearns, Esq., the patentee, and President of the company owning the invention. Every facility was extended and closest investigation invited. At the office, 176 Broadway, a large working model was shown. Practical

railroad men heartily indorsed the appliance in the strongest terms. There is no rational doubt that its general use will largely contribute to the comfort of passenger travel, while at the same time saving a very considerable percentage of expense, in the lessened strain upon locomotives and cars, and in friction upon rails and journal-bearings.

The company will, upon application, equip a car upon any line, at their own expense, for trial tests, and railroad managers are invited to make the most thorough tests possible.

When it is considered that the expense of the application is so trivial, either to the most approved patterns of passenger railway coaches, or to freight cars, or to the ordinary tramway or horse-cars, and also that the guaranteed results attainable are so favorable in financial aspect for the expense department of railroads, while securing increased comfort to an exacting public, it may be safely predicted that the new system will be universally adopted.

We will quote from a few of the statements made by railroad men who have been testing the box. The originals of documents from which these extracts are made may be seen at the office, 176 Broadway, New York.

One official writes:—

"I send you by express this P. M., two bearings; one was run with your box two months, and the other under opposite end of car, three weeks with old-style box, and weighs four pounds and fourteen ounces; while the other (in your box) weighs just seven pounds. They speak for themselves. The car travels over 200 miles daily. The bearing in your box run 12,084 miles; that in the old-style box 3,420 miles. Original weights same."

Another official writes:—

"April 9, 1883, I applied under one end of mail car the Stearns Self-Adjusting Axle-Box, and find the following results: The Boxes have run cool, and have not been obliged to remove bearings during the time. The box also prevents the bearings from cutting on collar of journal, and I also find the box keeps the flange of wheel from becoming sharp, which is a great improvement over the old style of boxes. I have inspected these new boxes daily and found that the outside plate of wheels becomes greasy and dirty from the start, while on the other end of the car the wheels were kept bright on account of their coming in contact with the wheel beam. This shows that the new boxes prevent the flange of the wheel from cutting or becoming sharp, which is a great saving over the old-style boxes. Since I applied the new boxes, it has become necessary to remove the bearings on the other end of the car two different times. I consider the new boxes an improvement on the old style of journal boxes and will save the flanges and bearings, and do away with a greal deal of friction."

A conductor writes:—

"I have run car equipped with Stearns's Self-Adjusting Car Axle-Box for the past eight months, and running daily 150 miles, and can safely say that the said car gave me no trouble in any way, shape or manner. Neither was the car taken off for repairs during the time I ran it. It is all that is claimed—no hot boxes; riding easier; saving of bearings, wheel and rail."

The following, which is signed in the original by several railway-mail agents on a prominent railroad, is worthy of consideration as illustrating the claim that the use of the appliance conduces to the ease of occupants of cars in travel. These officials write:

"The Stearns Axle-Box has been in use nearly two months under end of car in which we distribute and handle the mail matter daily, and we find as a result, our end of the car rides much easier than formerly and without any lateral motion. The change enables us to stand in the mail room, directly over the truck, and assort mail matter easily while going round curves. This was almost impossible with the old-style box."

The officers of the company are: Oscar S. Stearns, President; J. Sanford Potter, Secretary. Communications are invited, and will receive prompt attention. Address Stearns Railway Improvement Company, 176 Broadway, New York.

A Self-Closing Oil Can.

Messrs. JACKSON, DAILEY & CO., of Sharpsville, Penn., manufacture a patent self-closing engine oiler, of which we proceed to give a short description. Accompanying is a picture of the oil can, which is much liked and used quite extensively.

In the self-closing can is a valve applied to the spout, and the supply of oil through this valve is regulated by means of the thumb-piece above the handle of the can. The valve is always closed except when pressure is applied at the thumb-piece. Obviously the flow of oil being absolutely under regulation, all waste is prevented.

Among the many who use this simple and economical device are several railroads. It is adapted to all purposes requiring the use of an oil can, and ought to be made as widely known as possible.

Important Facts for American Manufacturers and Importers.

THE Australian colonies import over $400,000,000 annually. The United States have but $14,000,000 of this vast trade, yet it is a positive fact that American manufactures are greatly preferred over those of other countries. American hardware generally, tools of all kinds, machinery, agricultural implements, safes, building materials, sewing machines, stoves, furniture, carriages, clocks, lamps and glassware, kerosene oil, canned goods, tobacco, timber, flooring, roofing material, drugs, dental goods, etc., are much preferred over those of English make, though the colonial merchants have heretofore bought nearly all their American goods in London. The population of Australia are English speaking people, doing business upon our own methods and systems; correspondence and business transactions with them are simple. Few people, when they think or speak of the Australian colonies, know that they contain 3,111,937 square miles of territory, nearly two thousand millions of acres, for the most part fertile land. The population is about 5,000,000. In the season of 1880-'81 no less than 8,371,238 acres were cultivated. The production of wheat amounted to 50,346,950 bushels; oats, 25, 766,875 bushels; barley, 5,506,191 bushels; corn, 9,335,239 bushels, and 1,723,587 bushels of other cereals. Potatoes raised, 724,155 tons, or 24,138,500 bushels; of hay, 1,561,158 tons; 2,171,861 gallons of wine were vintaged. The mean average of the wheat crop for Australia was 12.40 bushels, and for Australasia, 15.25 bushels. Of live stock there were 1,465,655 horses, 9,878,782 cattle, 70,915,765 sheep, and 522,337 pigs, making a total of about 90,000,000 head of live stock. These figures show plainly the great advantages to be derived by establishing direct trade relations with that country, and though comparatively small at first, the trade is bound to grow as population increases. —*Australasian.*

THE Chesapeake and Ohio is to enter Cincinnati, crossing into that city over the Kentucky Central, that is if the practical consideration of this improvement shall result in

action, which, we learn, is probable. A local paper reports that the Chesapeake and Ohio has been laboring under a great disadvantage for want of proper connections with Cincinnati, or at least a terminus in that city, as at present all freight and passengers for that road going either east to the seaboard or southwest to Memphis from that point are obliged to leave over the Kentucky Central from Covington, and the transfer that it is necessary to make is, of course, disadvantageous, especially so in the matter of freight. When the movement which is now on foot is consummated, the Chesapeake and Ohio will be independent, and an active competitor in the market for traffic for the seaboard organization in the North, Northwest and West, which can then be transported to the ocean at Newport News, as good a point as there is on the coast for making European shipments, and much nearer to Cincinnati than is New York. Also of special interest to Cincinnati is the fact that Mr. Huntington has been negotiating with the Ohio Central for a lease of that road from Charleston, on the Chesapeake and Ohio, to Point Pleasant—or, rather, a point opposite, on the Ohio side of the river—including the use of the bridge which is now under course of construction and will soon be finished. The channel span, upon which work is about to be begun, will complete the structure. The directors of the Ohio Central will hold a meeting in a short time and consider the propriety of leasing the road and bridge to the Chesapeake and Ohio. It is stated that no opposition will be made by any of the directors to the proposed lease. After getting across the river, Mr. Huntington's plan is to build a piece of road to Portsmouth, a distance of about fifty miles from that point, on into the Queen City. All will be easy, as the scheme is to purchase or lease the Cincinnati and Eastern and change it to a standard gauge. The latter road is now completed to Henley, within eighteen miles of Portsmouth, and will reach that point by the first of October. From Newport to Portsmouth, all that will be necessary will be to change the iron, as the grading, etc., has all been done with a view to making the road a standard gauge. At the Cincinnati end of the road, preparations have also been in progress, all new ties that are put in being eight feet. The Cincinnati and Eastern at present comes into the city from Idlewild, three miles over the Cincinnati Northern tracks, but an arrangement has been made for an entrance at the Cincinnati end.

The Varnish Trade in the United States.

GREAT care has been taken in the preparation of this article, that its statements should be absolutely accurate; and it may be relied upon as giving a correct account of the origin and developments of the varnish trade in the United States. Its value as such is obvious to every reader.

ENGLISH VARNISH IN AMERICA.

The late John R. Lawrence, of New York, noted in his day for unusual enterprise, was the first American carriage-builder who used English varnish. He had then been in the business about forty-three years, and it was about the year 1835, when the firm was Lawrence & Collis, that he made the first importation of varnish from Great Britain.

At that time, all carriages made in this country were polished in a manner very similar to the present mode of polishing pianos. English carriages were then frequently imported, and Mr. Lawrence had often studied the appearance of their finish, and wondered how it was produced. The great trouble with the polished carriages was the readiness with which they spotted and discolored when exposed to moisture. A wealthy citizen of New York and a good customer of Mr. Lawrence, had ordered of him a fine coach, but complained that it changed color badly. Mr. Lawrence visited his coach-house, and finding it very damp, assured the gentleman that any varnish would perish when exposed to so damp an atmosphere. "But not so readily," answered the other, and he then showed an English coach which had been stored in the same room for many months, and whose appearance was decidedly more lustrous than that of the new one.

The above incident led Mr. Lawrence to look thoroughly into the subject, and he determined to obtain and test some of that English varnish if possible. He wrote to a business acquaintance in London, and through him received a sample ten-gallon lot in 1835. At the time of receiving it, he had with him an employé who had formerly worked in a London carriage shop, and this man was called upon to give suggestions about using the new varnish. He represented that it was polished in the same manner as in America, so a heavy coat was applied, and the men waited patiently for it to dry. At the end of a week it had scarcely begun to do this. A month passed by, and then an attempt was made to rub it, but the painters found this impracticable. At the end of three months the attempt was again made, but again failed signally; and the painters were disposed to curse the new varnish as a humbug and a swindle.

During these three months, the vehicle had been run out into the sun every pleasant day, and every possible pains had been taken. Three months more elapsed, but without any further progress. It then happened that one day, while Mr. Lawrence was examining the varnish on the English carriage, and trying to solve the mystery of its application, that in scrutinizing the arch panel, which was just opposite a window and exposed to a strong light, he noticed what he thought were brush marks on the surface. He called his varnisher, and between them and the brush-marks it was decided that this surface must have been finished without polishing. Here was an important fact brought to light, and they hastened to reduce this new knowledge to practice. The coach previously spoken of was given another thin coat of the English varnish, which worked without much trouble, as the first coat had been often rubbed down; and although not so easily accomplished nor so satisfactory as later jobs, this first experiment with imported varnish was decided to be a success, and Mr. Lawrence thereafter continued its use. Mr. Wm. B. Crosby, then a prominent New York citizen, became the possessor of this first American carriage finished with English varnish.

For several years the firm of Lawrence & Collis kept their method of finishing a secret, importing privately from London, and paying a round price of from fifteen to eighteen dollars per gallon. Within a few years afterwards, other carriage-builders began to try the English article, generally through the recommendation of painters who had used it in the old country. It met with much opposition at first, but one by one the leaders of the trade became converts, until about 1852, when an agency for its sale was opened in New York; and

that year is generally mentioned as the date of its introduction.

Such is the history of the introduction of English *flowing* varnish in this country, in place of the *polishing* varnish that had before that time been exclusively used. For nearly twenty years afterward, or until 1870, it stood unrivaled in this country and throughout the world; and although no adequate explanation could be offered why American manufacturers of varnish should not be able to equal the imported, they signally failed in their attempts to do so, and painters generally had settled down in the opinion that England alone could make finishing varnish. In 1870, however, a rival appeared in the now celebrated "Valentine varnish," which after thorough tests and gradual adoption by many of the leading coach and car-builders, was first admitted to fulfill its claim of "equality with the best English," and was afterwards announced better adapted for general use, inasmuch as it was lighter in color, easier working under the brush, safer as regards results, and not so liable to spot and discolor. Armed with these valuable qualities it was soon successful, not only in supplanting the imported article in America, but in gaining an important trade in England, and throughout the carriage centers of the world, where it is now looked upon as "the standard of uniformity and excellence."

FIRST AMERICAN VARNISH FACTORY.

In 1820, Franklin Houghton, in company with David McClure, made varnish in Cambridge, Mass. Their shop was the back part of the blacksmith shop of Dexter Pratt, situated on the road leading to Mount Auburn. This was in the vicinity of Longfellow's late home, and it was upon this very shop that he wrote his well-known poem, "The Village Blacksmith," which begins with the familiar lines, "Under the spreading chestnut tree, the village smithy stands," etc. This shop remained standing until 1865, when it was burned.

In the back part of this building, Messrs. Houghton & McClure inaugurated the business of varnish making for the trade. A kettle holding about eight gallons was used, and as fast as made the varnish was taken to Boston and sold to the carriage-builders. They did well at the business, finding a ready sale for all they could supply. It is said that they realized a dollar an hour apiece for working hours, which was considered capital pay in those times. The business increased to such a degree that they afterward removed to a new shop which they built in the vicinity of Boston, where the business still continued to prosper. Houghton retired on account of impaired health, thought to have been caused by inhaling the varnish fumes; and McClure, for the same reason relinquished the business in 1827, after having realized a competency therefrom.

Pike & Samuel Shedd had made varnish for the Boston carriage-makers many years before the starting of Houghton & McClure, but the former had merely gone from shop to shop when occasion required, and assisted in making the varnish in each, the materials being supplied them by the carriage-builders; whereas Houghton & McClure manufactured and sold upon their own responsibility.

The business now represented by Valentine & Co., established in Boston in 1832, was practically a continuation of that relinquished by McClure, as they immediately succeeded to the trade he had established.

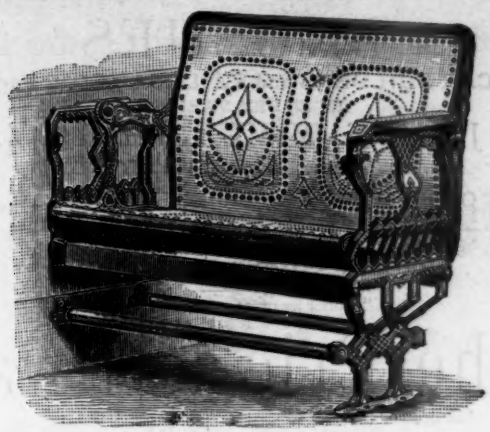
VALENTINE & CO.

The business of varnish making now carried on by the Messrs. Valentine & Co. in New York, was first founded by that house in Boston, Mass., in 1832, with their factory at Riverside, a suburb of Cambridge. In 1870 they became assured that they had at last attained a result which had long been their aim, and on Oct. 15th of that year, they first published the announcement, "We claim that our varnishes are fully equal to the best imported!"

About the same time they became interested in the Piotrowski "wood filling," as manufacturers and agents, an article for permanently filling the pores of wood previous to painting, which, under their enterprising supervision, was widely introduced, and resulted in a complete revolution of the method of painting previously practiced by carriage and car-builders, and which proved a great boon to those trades, by reducing the time and expense incurred in the process of painting, and rendering the result more satisfactory and more permanent.

In the following year they removed their main office to New York, and their factory to Brooklyn, where they still remain, while they have since established branches in Boston, Chicago, London and Paris.

The present company, retaining the old firm name of Valentine & Co., was incorporated in January, 1882.



GARDNER'S NEW REVERSIBLE CAR SEAT No. 8.

[*Patented Dec.* 6, 1881.]

As the back reverses, it raises the front of the seat so as to prevent the passenger from slipping off the seat, and removes the objection heretofore made to this kind of seat.

The large orders already received from the N. Y. C. and H. R. R. R. and other prominent Companies for our No. 8 Seat, is the best guarantee of its merit.

Made with Perforated Veneer, Leather, Plush, and Rattan Seats, which are interchangeable: one kind of seat can be used in the Summer, and the other in the Winter.

☞ Please send for Descriptive Circular giving full particulars and prices.

GARDNER & CO.,

Patentees and Manufacturers of

Car Seats, Car Ceilings, Depot Seats,

ETC.,

183 Canal St., NEW YORK.

FACTORY: 330 to 342 E. 61st Street.

GET THE BEST.

CHAS. D. THUM,

150 North Third St.,

PHILADELPHIA,

Manufacturer of every description of

Coach, Carriage and Railway

Brushes;

Paint and Sash Tools,

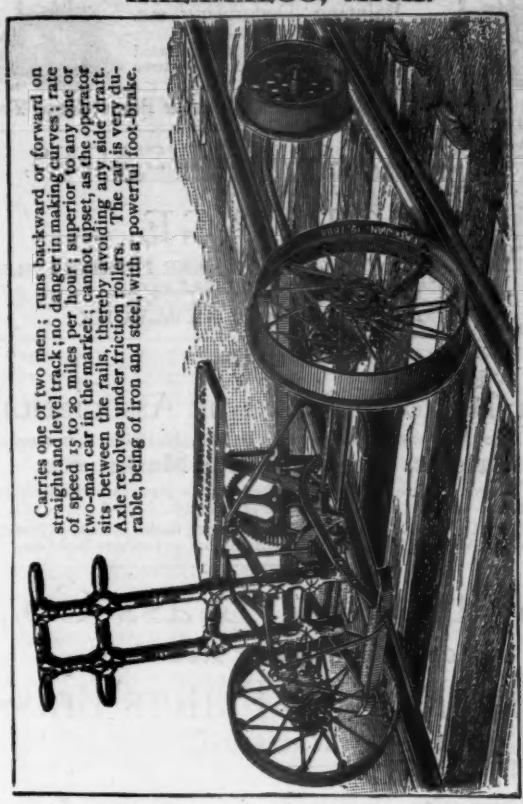
Fitch, Badger & Camel-Hair Varnish (extra thick and strong).

Camel, Ox and Sable Pencils, etc.

The celebrated THUM HALF-ELASTIC VARNISH BRUSH is warranted to stand until it is worn out. It can be used for finishing without being previously worn down; will last longer and carry more varnish than any other brush. Ask your dealer for them, or send for a circular.

Kalamazoo R. R. Velocipede Co.,

KALAMAZOO, MICH.



Carries one or two men; runs backward or forward on straight and level track; no danger in making curves; rate of speed 15 to 20 miles per hour; superior to any one or two-man car in the market; cannot upset, as the operator sits between the rails, thereby avoiding any side draft. Axle revolves under friction rollers. The car is very durable, being of iron and steel, with a powerful foot-brake.

WE MAKE CARS FOR ANY GAUGE TRACK.

Send for Illustrated Circular.

Licensed under Patents of Sheffield Velocipede Car Co.

The Improved Hancock Inspirator for Locomotives.

Send for circulars and full particulars to the

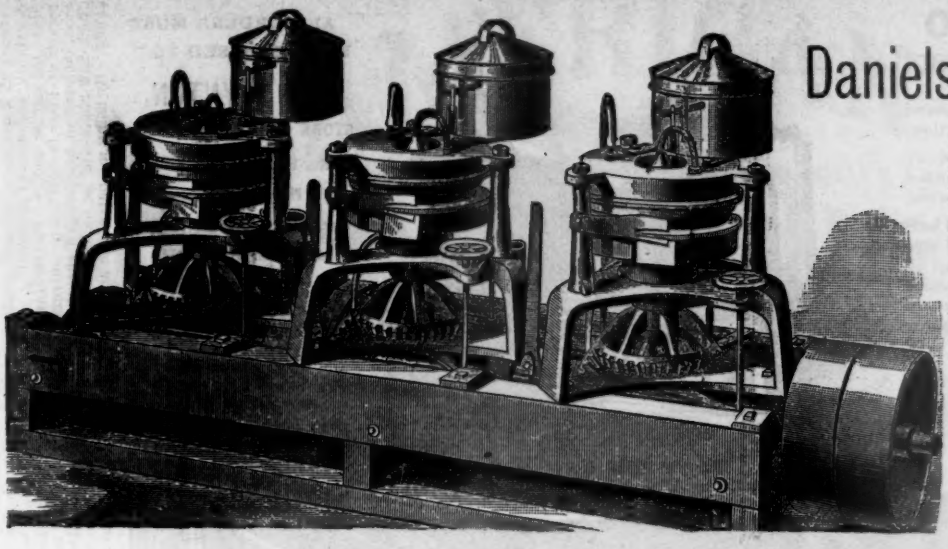
Hancock Inspirator Company,

No. 34 BEACH STREET,

BOSTON, MASS.

Prominent Locomotive and Car Builders.

Adrian Car Works, Adrian, Mich.
W. C. Allison, Junction Car Works and Flue Mill, Philadelphia, Pa.
Altoona Car Works, Altoona, Pa.
Atlanta Machine Works, Atlanta, Ga.
Baldwin Locomotive Works: Burnham, Perry, Williams & Co., Phila., Pa.
Barney & Smith Manufacturing Co., Dayton, Ohio.
Beaver Falls Car Co., Beaver Falls, Pa.
Osgood Bradley, Worcester, Mass.
J. G. Brill & Co., Philadelphia, Pa.
Brooks Locomotive Works, Dunkirk, N. Y.
Brownell & Wight Car Co., St. Louis, Mo.
M. M. Buck & Co., St. Louis, Mo.
Erie Car Works, Erie, Pa.
Gilbert & Bush Co., Troy, N. Y.
Harlan & Hollingsworth Co., Wilmington, Del.
Haskell & Barker Car Co., Michigan City, Mich.
Hazelton Car Works, Hazelton, Pa.
Indianapolis Car and Manufacturing Co., Indianapolis, Ind.
Jackson & Sharp Company, Wilmington, Del.
Jones Car Manufacturing Co., Schenectady, N. Y.
Keith Manufacturing Co., West Sandwich, Mass.
Kingston Car Works Co., Kingston, Canada.
Laconia Car Co., Laconia, N. H.
Lima Car Co., Lima, Ohio.
Wm. Mason & Co., Taunton, Mass.
Mansfield Machine Works, Mansfield, Ohio.
Muskegon Car and Engine Works, Muskegon, Mich.
Ohio Falls Car Co., Jefferson, Ind.
Pardee Car Works, Watsontown, Penn.
Portland Locomotive Works, Portland, Maine.
Pullman Car Co., Pullman, Ill.
Rogers Locomotive and Machine Works, Paterson, N. J.
Schenectady Locomotive Works, Schenectady, N. Y.
The John Stephenson Co. (Lim.), New York City.
Taunton Locomotive Works, Taunton, Mass.



THE

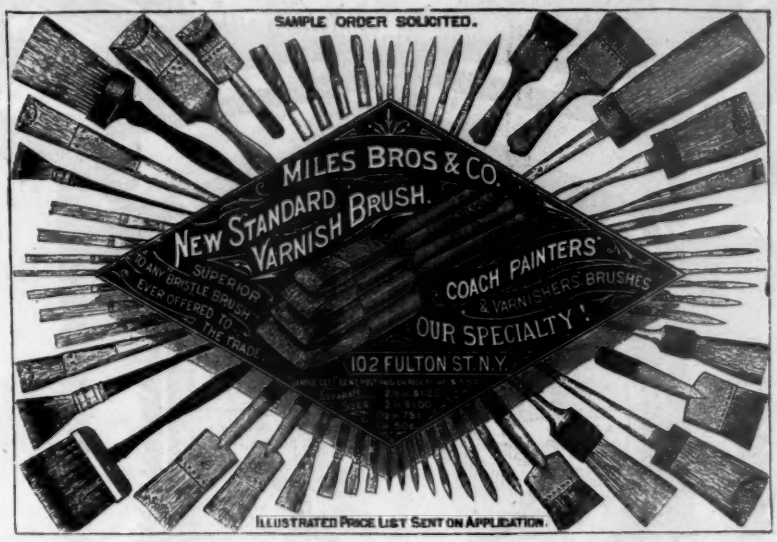
Daniels Paint Mills.

The cut represents three mills on one bench, all driven by one belt; the stones are cooled with water expressly for grinding Coach Colors in Japan and Varnishes. The larger sizes are especially adapted for grinding car and all fine oil colors.

These Mills are now in use by nearly all the large manufacturers in the United States and Canada.

I also build a variety of Mills for the more common paints both dry and in oil. These common Mills are without the cooling appliances.

WILLIAM DANIELS,
Patentee and Sole Manufacturer,
55 Atlantic Avenue,
BROOKLYN, N. Y.



Established in 1836.

Lobdell Car Wheel Company,

WILMINGTON, DELAWARE.

GEORGE G. LOBDELL, PRESIDENT.
WILLIAM W. LOBDELL, SECRETARY.
P. N. BRENNAN, TREASURER

IMPROVED

Sheet Iron Roofing.

Best Quality and Simplest Plan in use.

MANUFACTURED BY

T. C. SNYDER & Co., Canton, O.

Cheaper, stronger and less liable to get out of repair than tin. Any mechanic can apply it. Sample Circular and Price List free by mail at request. Also,

AGENTS FOR LOWE'S METALLIC PAINT.

MANUFACTURERS OF

Pentz Patent Rein Holders, and Davis's Rock Drill Machines.

W. R. SANDERS,

NEGOTIATOR AND PROMOTER.

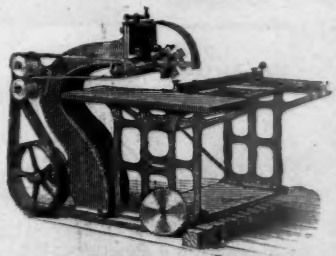
Railroads and Timber Lands Special.

New Bonds Placed. English Connections. Correspondence Solicited

202 BROADWAY, N. Y.

C. B. ROGERS & CO.,

Manufacturers of the Latest Improved



Wood-Working Machinery

For Car Builders, Planing Mills, Cabinet, Carriage and Railroad Shops, House Builders, Sash, Door and Blind Makers.

Warerooms: 109 Liberty St., New York.
Factory: NORWICH, CONN.

The E. M. Boynton Saw and File Company, Manufacturers of all kinds of Saws, Saw-sets, Patent Cross-cut Handles, Tools and Files,

Factories: 36, 38, 40 and 42 Devoe Street., Brooklyn.

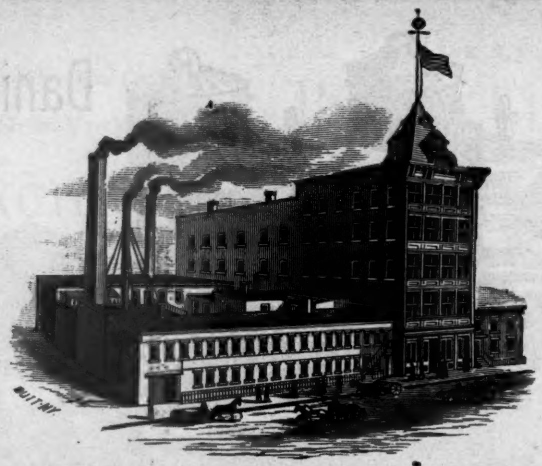
Office: 80 BEEKMAN STREET, NEW-YORK.

500,000
SOLD IN 1880.

Not one in a thousand failed to give satisfaction.

The First Award of Australia has been added to the Centennial Awards.

The 12-inch log at bottom of this picture was sawed off by two men by hand in 7 seconds before Commissioners of every country and the Emperor of Brazil.



THE E. M. BOYNTON SAW & FILE CO.
34, 36, 38, 40 & 42 DEVOE ST.
BROOKLYN.

ALL ORDERS MUST BE ADDRESSED TO

E. M. BOYNTON,

STORE AND WAREHOUSE,

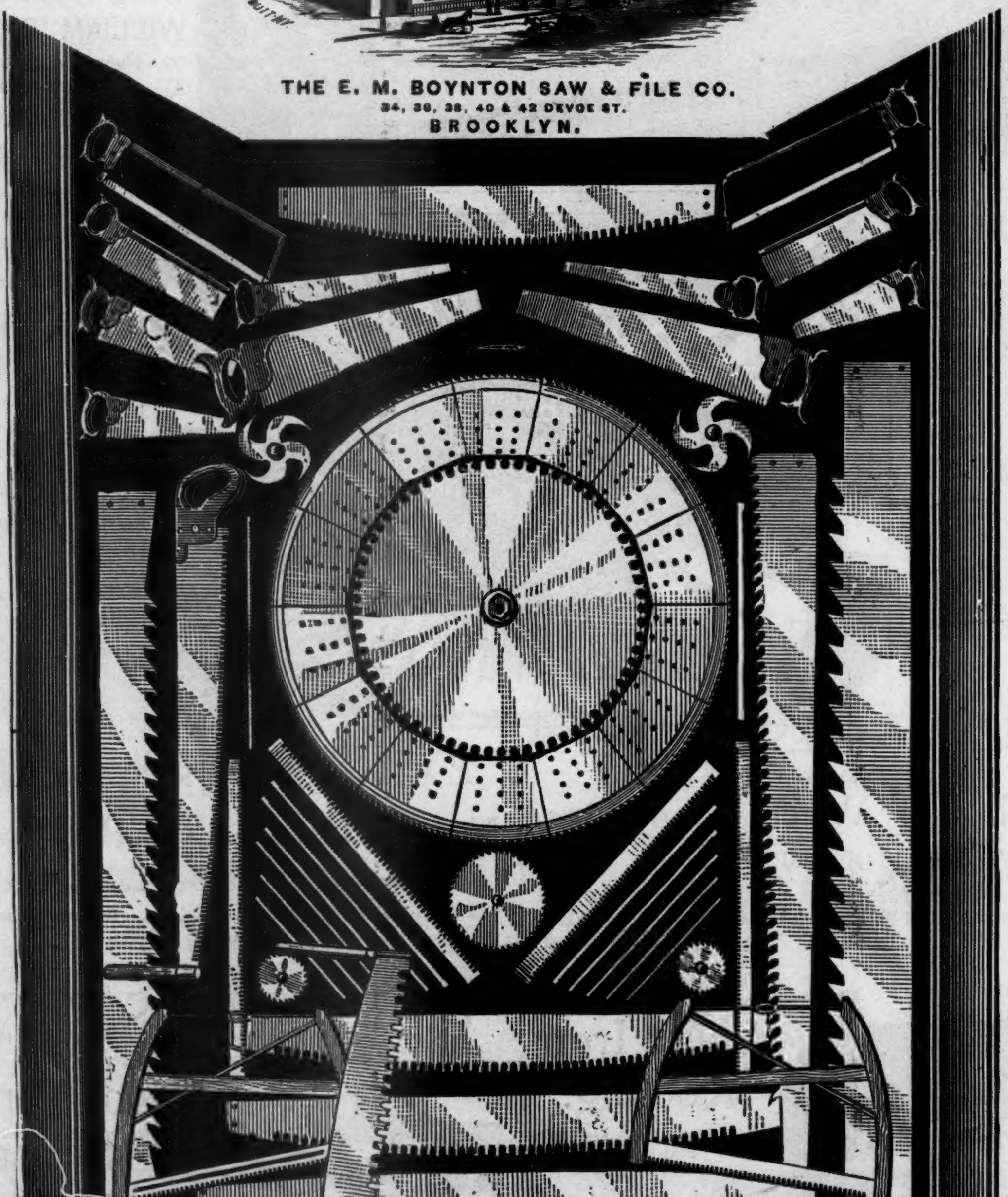
No. 80 BEEKMAN ST.,

N. Y. CITY,

WHERE A FULL ASSORTMENT OF

SAWS, FILES, AND TOOLS,

ARE KEPT.



Beats all machines. My new goods are guaranteed unrivaled in speed, durability, and ease of sharpening. A six-foot Cross-Cut Saw, with combined file and set and two Patent Handles, will be sent to any address upon receipt of Four Dollars. The universal Pat. sheathed, Pruning and Hand Saw, inclosed in brass-edged sheath, mailed on receipt of One Dollar. A Buck Saw blade will be inclosed with the Cross-Cut for fifty cents additional. By using my patent file a Cross-Cut may be sharpened at a cost of five cents, and a Buck Saw for five cents. Send for illustrated price list. I make a liberal discount to honest dealers, and will protect them.

I have obtained decree, with costs and damages, against all parties who imitate my **M** teeth which cut with the outside of the **M** only. The two points of each tooth are set upon one side and the next two points on the other side, equivalent to front cut of ordinary hand-saw tooth, both ways, one point alternate decreases cutting one-half, as do all imitations (which are still held liable by the United States Court), and new Company will now collect of dealers and users, as well as manufacturers, for infringements. An Illustrated Catalogue furnished free on application.

For One Dollar, a Pruning Saw, complete, with brass edge sheath, or a Buck Saw blade, will be mailed. Agents wanted, to whom special terms will be made, and who can do well. This Company also manufactures the **Noon-day Stove Polish,** so rapidly coming into favor.